INTERNATIONAL SCIENCE NEWS & INSA DELEGATION REPORTS

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Agreement for Scientific Co-operation & Scientific Exchange

between

The Indian National Science Academy, New Delhi, India

and

Norwegian Academy of Science and Letters, Oslo, Norway

The Indian National Science Academy has bilateral scientific co-operation agreements with the scientific academies of various countries The scientific collaborative agreements are mainly for the exchange of scientists in specific areas for a stipulated period. Recently, the INSA has entered in a similar agreement with the Norwegian Academy of Science and Letters.

An agreement has been signed on October 19, 1983 by Professor A K Sharma, President of the Indian National Science Academy on behalf of the INSA and Professor Hagne Skodvin, President, the Norwegian Academy of Science and Letters on behalf of the NASL at Oslo, Norway. Both the sides agree upon :

I. The exchange sponsored by the two Academies will involve distinguished scientists. They will be chosen depending on the value of their work and on the influence that their mission can have on the development of research centres in India or in Norway.

The missions will cover various activities: visits to laboratories in the host country; lectures or panels of discussion on subjects of mutual interest; participation in workshops and seminars and possibly in scientific conventions etc. Some of these visits can lead to sustained and durable relations between Indian and Norwegian Laboratories.

II. The duration of each mission will be from one to eight weeks. The total number of exchanges organised by the Academies will be at the most six per year. Initially, the maximum quota will be 24 man-weeks.

The party which delegates the scientist will bear the travelling expenses to and from the host country; the party receiving the scientist will provide local expenses of the visitor including living expenses and internal travel.

International Science News & INSA Delegation Reports

EDITOR'S NOTE

INSA is committed to the growth of natural knowledge in India and its application to the problems of national welfare. Being the adhering body in India for the ICSU, the Academy is entrusted with deputing Indian delegations to various international conferences and symposia. Since its inception in 1935, INSA has endeavoured to promote the dissemination of scientific knowledge and matters concerning science policy and philosophy of science. The Fellows of the Academy have played a major role not only in practising science but in actively participating in professional meetings the world over.

Realizing that the three scientific journals being published by the Academy are primarily devoted to the communication of scientific research findings, a new quarterly journal has been started to cover international science news and present delegation reports to the Fellowship and to the Indian scientific community at large. The contents of the journal covers: *(i)* reports of General Assembly meetings of ICSU and other organizations; *(ii)* reports of INSA delegations sent abroad; *(iii)* brief accounts of individual scientists sponsored by INSA to attend conferences; *(iv)* highlights of international conferences in specialized areas of research; *(v)* experiences of scientists under Inter-Academy exchange programme; *(vi)* summaries of lectures delivered by distinguished scientists and *(vii)* excerpts of news-worthy items from leading international scientific journals.

Through this publication, the Academy aims to spread current developments in scientific knowledge and to ascertain view on values and judgements in science and technology.

It has been an year now since the idea of publishing the delegation reports was first conceived. We have been receiving objective reports of the delegates sponsored to various international conferences and symposia. Apart from reporting to the Academy about their individual contributions to a given conference, the delegates are expected to focus attention on its main theme as well as highlight the major conclusions for the benefit of the wider community. This will provide an overall picture of the conference to the interested reader and thus help in meeting the basic obligations of the journal.

The number of write-ups received by us in last one year was much more than could possibly have been included in this journal. In order to cover the maximum number of conferences/symposia, some of these reports are being included as short communications, and more such items are envisaged in the forthcoming issues. We also look forward to suggestions for improving the contents and scope of this journal.

A N Mitra

FIRST WORLD CONFERENCE OF BRYOLOGY—A REPORT*

The International Association of Bryologists (IAB) organised the first World Conference of Bryology in Tokyo (Japan) from May 22–28, 1983. The conference was held at the National Science Museum, Ueno Park, Tokyo, under the chairmanship of Dr Sinske Hattori (Hattori Botanical Laboratory, Nichinan, Japan).

About one hundred and fifty bryologists from all over the world attended the conference. Among the leading senior bryologists present from outside Japan were: Professor L E Anderson (North Carolina, USA), Professor M Bopp (Heidelberg, W Germany), Professor S W Greene (Reading, UK), Professor P W Richards (Cambridge, UK), Professor A J Sharp (Tennessee, USA) and Professor W C Steere (New York, USA). There were seven participants from India.

In all seventy two papers were presented. They dealt with recent aspects of bryology, with emphasis on phytogeography, systematics, evolution, ecology, physiology, morphogenesis, and chemistry of bryophytes. The significant findings presented in the conference, and the proposed future lines of investigations are summarised in the following pages :

Phytogeography and Systematics

Dr H Deguchi (Kochi, Japan) apprised the audience of the wide range of ecological diversity of the moss flora of Japanese Islands, which cover subtropical to subarctic regions, and he discussed its floristic affinities with other areas of the world. In general, the moss flora of this region comprises phytogeographically miscellaneous elements. Dr J Hasegawa (Kyoto, Japan) proposed that as regards the anthocerote flora, Japan may be one of the most interesting areas of the world. All six general, including the three tropical ones, occur there. Sixteen species distributed in Japan are divided into six floristic elements, viz. Paleotropical, East Asian, North Pacific, Arcto Tertiary, Boreal and Cosmopolitan.

A comparative study of the moss flora of Phillippines and that of neighbouring islands done by Dr B C Tan (Laguna, Phillippines) indicates that the Philippines moss flora probably evolved in situ after the various islands drifted to their present geographical position at the beginning of the Tertiary.

The moss flora of continental Antarctica presents certain interesting features as revealed by Dr R D Seppelt (Tasmania, Australia). It is limited to a few widely distributed species. Some mosses occur submerged in lakes. Field observations on

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*Based on the delegation report of Dr S C Bhatla, Research Associate, Department of Botany, University of Delhi.

lake mosses and mosses innundated by rising melt waters during summer thaw, indicated an inherent potential for gross morphological change in some species. Laboratory experiments have shown that the aquatic moss *Bryum korotkevicziae* and its variety *hollerbachii* are monotypes of the terrestrial *Bryum algens*.

A study of the bryoflora of the island Newfoundland (Canada) done by Dr G R Brassard (Newfoundland, Canada) revealed that it consists of 445 species of Musci and 150 species of Hepaticae. There are substantial differences between the moss flora of this island and those of adjacent regions. The strong bryogeographic isolation of the island indicates that the origins of its moss and liverwort floras have followed a more complex pattern than of those in neighbouring regions.

Systematics generally pertains to the analysis of the kinds and diversity of organisms, and of the relationships among them. But in a true sense taxonomic investigations of bryophytes should deal not only with the analysis, identification and description of taxa, but also with the synthesis of these data in an attempt to elucidate the relationships among the taxa. Dr H P Ramsay (Kensington, Australia) and Dr D H Vitt (Edmonton, Canada) presented their findings on the distribution, cytotaxonomy and sexuality of *Macromitrium* in Australasia and the Pacific. This genus is interesting since it exhibits the phenomena of anisospory, sexual dimorphism and heteromorphic bivalents. Evolutionary trends within the genus are through aneuploidy with n = 6, 8, 9, 10, 11 or 12, but n = 9 is most common in thc species examined. In the extreme cases of sexual dimorphism in *Macromitrium* dwarf males are found, which are as small as 1/10 the size of a female leaf, but are rarely more than 1–2 mm in height. These tiny male plants may be found on stems, leaf surfaces, in the axils of leaves or even in the perichaetium among archegonia and developing sporophytes. Monoecious and dioecious species with normal-sized males also occur.

In addition to these findings several papers were presented describing the characters and distribution of various taxa such as *Fissidens* (Brazil), *Didymodon* (Europe), *Rhodobryum* (Asia), *Regmatodon* (South America), *Radula* (India), *Merchesinia* (Europe), *Monoclea* (New Zealand, Argentina, Central America and Caribbean islands) and *Plagiochasma* (India).

Dr C Gao (Shenyang, China) talked about the bryological activities in China. The early records of bryophytes in China could be found widely in ancient medicinal and agricultural works since sixth century, but the taxonomic research on bryophytes started in 1840s. Until forties of the 20th century, some westners investigated Chinese bryoflora. Only after the founding of New China, the Chinese workers first became active. There are some 1,625 mosses belonging to 62 families and 354 genera, and 654 hepatics belonging to 46 families and 130 genera so far known to occur in China.

Evolution

The phylogenetic position of bryophytes has thus far been worked out most extensively using morphological and anatomical features. Concepts based on these features were throughly re-evaluated by Professor S S Kumar (Chandigarh, India)

and Dr W R Buck (New York, USA). The direction and rate of evolution in biological populations is determined primarily by two factors, viz genetic variation stored in populations, and selection (Dr J Szweykowski, Poznan, Poland). Despite considerable studies on the chromosome numbers of bryophytes in the past 30 years (1950–1980), the information obtained thus far has not been effectively utilised to solve the problems pertaining to bryophyte systematics and evolution (Dr L E Anderson, North Carolina, USA). Chromosome data have rarely been treated as decisive characters in bryophyte evolution. This is partly because of the frequent intraspecific polyploidy and aneuploidy, which make the inference of evolution directions difficult.

Recent concepts on the patterns of evolutions in Hepatics were presented in the conference by Dr J Szweykowski (Poznan, Poland). Diploid status of the prevailing developmental stages of the hepatics concerned are crucial for employing genetic variation as a means for evolution. As bryophytes live their life mainly in the haplophase, they can not use this mechanism. Dr Szweykowski also considered the significance of polyploidy for hepatic evolution.

Bryophytes exhibit numerous morphological series in which structures well developed at one end are reduced or absent at the other. The uniform absence of a morphological feature in one taxon and presence in possibly related taxa, makes it equivocal whether absence is a primitive or derived state. The theory that during the course of bryophyte evolution, many "ancestral" developmental capacities became *suppressed* but *not lost*, was nicely discussed in the conference by Dr D V Basile and Dr M R Basile (New York, USA). The relative size or very presence of a structure is solely a function of the stage (between inception and maturation) when development is suppressed. In the recent years a promising experimental approach has been adopted to identify the critical biochemical components of the morphoregulatory system that function to suppress development in bryophytes at a particular stage. Three such components which include auxin, ethylene and a cell surface glycoprotein containing hydroxyproline have been identified. Deeper investigations on this aspect have been recommended to understand the biochemical mode of evolution in bryophytes.

Yet another recent approach to establish the evolutionary relationship of bryophytes, was suggested by Drs K Katoh, H Hori and S Osawa (Osaka, Japan). This is to determine the nucleotide sequences of cytoplasmic 5s rRNA. Investigations have already been carried out on this line using a thalloid liverwort *(Marchantia polymorpha)*, a leafy liverwort *(Lophocolea heterophylla)*, a moss *(Plagiomnium cuspidatum)* and a horn liverwort *(Anthoceros punctata)*.

Ecology

In the ecology session of the conference some very informative and interesting findings were presented revealing the adaptabliity of bryophytes to varied environmental conditions, and their ecological importance. Bryphytes are widely distributed on a variety of substrates. They may also be found on the antarctic islands, soil

covered with volcanic ash, as epiphytes and also on soils rich in specific mineral elements.

A study of the bryophyte flora of continental antarctica and sub-antarctic Macquarie island done by Dr P M Selkirk (North Ryde, Australia) revealed that vegetative reproduction rather than sporophyte formation plays an important role in dispersal and establishment of bryophytes in these regions. On the sub-antarctic Macquarie island only about 40% of the moss species are known to produce sporophytes. Vegetative propagules are abundantly distributed in the air, running and standing water, snowbanks, soil, gravel and rocks. The types of propagules commonly found include deciduous leaves and shoot tips, leaf gemmae, rhizoid gemmae, axillary bulbils and stem fragments.

Dr J M Glime and Dr RE Keen (Michigan, USA) emphasized the need for investigating mosses from the point of view of their role as biomonitors of pollution and bioaccumulators of toxic doses of metals like iron, copper and cadmium. Aquatic mosses like species of *Fontinalis*, *Hygroamblystegium fluviatile* and *Eurynchium riparioides* are more suited than higher plants as potential biomonitors of pollution since they are rarely eaten, have distinct macroscopic and microscopic symptoms, and decay slowly. Iron causes discoloration and formation of plates on the surface of the moss. Copper causes chlorosis of the tips, central cell body damage and plasmolysis. *Eurynchium riparioides* has the most distinct visible symptoms, whereas *Fontinalis antipyretica* var *gigantea* provides the best microscopic response. Cadmium is more detrimental to animals than to plants, but high uptake capability of mosses suggests that their use as bioaccumulators should be investigated.

A variety of bryophyte communities are associated with mineral rich substrates as revealed by the investigations of Dr GB Pant and Dr SD Tiwari (Naini Tal, India). Thus *Grimmia Pulvinata* is the sole colonizer on micaceous, granite rocks. The graphite schists are commonly vegetated with *Bryum cellulare*. *Jungermannia—Desmatodon—Dicranum* community is repeatedly observed on iron-limonite bearing rocks. The presence of circumpolar, arctic species, *Pohlia crudoides* is a characteristic feature of flushed, limonitic cliffs. *Campylopus* sp is the dominant moss of the gypsum community.

Bryophytes may play an important role in the ecosystem functioning in areas where mosses predominate in the vegetation (RE Longton; Reading, UK). Thus they may play an important role in primary production and its utilisation as a food resource. Bryophytes may also play a significant role as pioneers in xeroseres on rocks and on volcanic substrates, in nutrient cycling when mosses act as hosts for epiphytic nitrogen-fixing micro-organisms, and the formation of peat and humus. Dr Longton further suggested that bryophytes may play a distinctive role in some terrestrial ecosystems, resulting firstly from a relatively low demand for mineral nutrients, met in part from precipitation, and secondly, from an unusually high production of antibiotic substances.

Physiology and Morphogenesis

Papers presented in the physiology session of the conference were broadly concerned with the understanding of fundamental aspects of growth and differentiation in mosses. Of the various environmental factors, light probably has the most extensive influence on the life cycle of mosses. Professor E Hartmann (Mainz, W Germany) discussed the modulation of morphogentic activities (including spore germination, vegetative growth and sexual reproduction) in certain mosses on the basis of the concept that effects of light on development are achieved through a series of events: the initial perception of light stimulus, the transduction of this signal, and the observable morphogenesis which constitutes the response itself.

Bud differentiation in mosses is achieved only after the growing protonemal filaments have attained a critical length. In this respect, Dr K Yoshida and Dr K Yamamoto (Tokyo, Japan) presented their findings on *Physcomitrium sphaericum* and observed that in this moss a growing filament develops a lateral protrusion around every 5th cell from the apical cell and this protrusion grows into a lateral filament or a bud when it is positioned around the 8th cell from the tip. Once the longest main filament in a protonema was more than 18 cell long, the protonema differentiated buds.

In recent years, emphasis is being laid on the isolation and use of morphogenetically abnormal mutants to study the mechanism of the regulation of differentiation in mosses. Using such mutants, Professor D J Cove (Leeds, UK) demonstrated that in the moss *Physcomitrium patens* low levels of auxins are required to elicit the transition from primary chloronema to caulonema. Furthermore, high levels of auxins, cytokinins and light must be present coincidentally for the maximum induction of buds. Red light induces bud formation more effectively than other wave-lengths, and the action of red light can be, at least partially, reversed by subsequent far-red treatment, indicating that phytochrome is involved in the perception of light for bud formation. Similar observations have also been made on *Physcomitrella sphaericum.*

The environment of mosses growing under natural conditions comprises not only of factors like light and temperature, but also a wide variety of bacteria which remain associated with the plant surface. Professor Luretta D Spiess (Illinois, USA) presented her commendable findings on the the role played by a variety of bacteria in affecting bud formation in *Pylaisiella selwynii.* She proposed that the bacterial colonies associated with moss surface release, among many other substance, certain cytokinins and octopine—an unusual amino acid. The two compounds are taken up by the moss tissue and interact leading to the formation of normal gametophore buds. These findings were confirmed by raising the protonema cultures of *Pylaisiella selwynii,* and subjecting them to specific chemical treatments. It was further observed that in this system, neither cytokinins nor octopine induce bud formation by themselves individually. Moreover, action of octopine is specific since none other amino acid evokes similar response in interaction with cytokinins. It remains to be confirmed whether cytokinins and octopine have similar action in other mosses.

Environmental factors not only affect vegetative growth in mosses but are also involved in the onset of reproductive phase. Professor R N Chopra (Delhi, India) dealt in detail with the influence of factors like light and temperature on on gametangial formation in bryophytes. With the exception of *Riccia crystallina*, all species of liverworts so far investigated are either long-day or short-day plants. Among mosses, all but *Sphagnum plumulosum* appear to be independent of photoperiod for the onset of reproductive phase. The photoperiodic response in liverworts increases with increasing light intensity. Mosses, on the other hand, exhibit differential behaviour. *Leptobryum pyriforme* and *Bartramidula bartramioides* exhibit a linear relationship with light intensity for the response, whereas *Bryum argenteum*, *B coronatum* and *Barbula gregaria* have a specific light intensity requirement for optimal response. The photoperiodic effect in bryophytes is operative within certain temperature limits. Most bryophytes do not require a low temperature pretreatment for gametangial induction. Some become fertile in a broad temperature range, whereas others require a specific temperature.

Extensive investigations have been carried out in the recent past to understand the biochemical regulation of gametangial formation in bryophytes. Professor Chopra apprised the audience of the recent developments in this area. In vitro investigations have demonstrated the regulation of sex induction in bryophytes by carbohydrates, nitrogenous substances, metal ions, growth hormones etc. Carbohydrates, in general, enhance gametangial formation. *Riccia crystallina* and *Bartramidula bartramioides* develop gametangia in the presence of a carbohydrate, but *Bryum* sp (*B. coronatum* and *B. argenteum*) and *Barbula gregaria* respond even in its absence. Bryophytes respond differentially to various forms of nitrogen. Depletion of inorganic nitrogen (nitrate or ammonium) significantly favours gametangial formation. On the other hand, organic nitrogen (such as amino acids, peptone and urea) has differential effects on the enhancement of antheridial and archegonial formation in liverworts. Growth hormones have variable effects on gametangial induction. Indole-3-acetic acid increases archegonial formation in *Riccia crystallina*, but it is more favourable for antheridial production in mosses like *Bryum coronatum*, *B. argenteum* and *Barbula gregaria*. Gibberellins enhance antheridial formation in all the investigated bryophytes, whereas cytokinins stimulate induction of archegonia and inhibit antheridial formation in *Riccia crystallina* and *Bryum argenteum*. Auxins, gibberellins and cytokinins also interact in eliciting the response. Iron and copper chelating agents such as EDTA and EDDHA also favour gametangial formation. Salicylic acid (known to chelate iron and copper in certain animal system) inhibits gametangial formation in most of the mosses. In *Bryum argenteum* the effect of these chelates is accompanied with marked changes in the endogenous levels of iron and copper.

Dr S C Bhatla (Delhi, India) presented his findings on the involvement of cyclic AMP in the onset of reproductive phase in *Bryum argenteum*. It responds to cAMP treatment by exhibiting a striking enhancement of gametangial formation. Its action appears to be specific since other adenine derivatives tested are either ineffective or have very little effect. The similarity in response evoked by cAMP and phosphodiesterase inhibitors also indicates the presence and involvement of cAMP and its

degrading enzyme in the onset of reproductive phase in this moss. The physiological relevance of cAMP action in *Bryum* is further confirmed by the detection of adenylate cyclase (the cAMP biosynthesizing enzyme) activity in the fertile shoot apices, by employing electron histochemical means. The enzyme activity has been localized along the inner surface of plasmalemma, tonoplast and membranous systems of the developing plastids. These observations indicate that cyclic AMP might be playing a significant role in the biochemical regulation of growth and differentiations in mosses.

Chemistry

Papers presented on the chemical constituents of bryophytes dealt primarily with three different lines of investigations. Some were related to the chemical components of bryophytes known to exhibit or presumed to have some physiological significance in their growth and development. In this context Dr Y Ohta et al (Osaka, Japan) isolated and characterised a compound called pre-lunularic acid along with lunularic acid from the suspension cultured cells of *Marchantia polymorpha*. Lunularic acid, a naturally occurring stilbene carboxylic acid, was first isolated as a dormancy factor from *Lunularia cruciata* by Valio et al in 1969. Pre-lunularic acid is the first example of a "pre-aromatic" intermediate in the phenyl-propanoid-polymalonate pathway for the biosynthesis of numerous aromatic compounds. It is also proposed to be the immediate precursor of lunularic acid instead of the previously postulated hydrangenol.

Dr T Ichikawa et al (Kanagawa, Japan) reported the isolation and characterisation of six prostaglandin-like fatty acids from some mosses (*Dicranum*, *Dicranoloma*, *Fissidens*, and *Leucobryum* species), accompanied with a lot of straight chain fatty acids. The physiological significance of prostaglandins in plants is being increasingly realised keeping in view their well established involvement as stimulators of adenylate cyclase activity.

The second category of chemical constituents of bryophytes are those known or presumed to have specific biological activities. In this context Professor Y Asakawn (Tokushima, Japan) reported the isolation of some terpenoid and lipophilic aromatic compounds from some hapatics. A compound—Polygodial (from *Porella vernicosa*) displays potent piscicidal, anticomplement, plant growth inhibitory and cytotoxic activities. Sacculatal (isolated from *Pellia endiviifolia* and *Trichocoleopsis sacculata*) exhibits piscicidal and tumor promoting activities. Compounds eudesmanolides (from *Frullania*, *Diplophyllum*, *Chiloscyphus* sp), eremophilanolides (*Frullania*), guaianolides (*Porella*, *Wiesnerella* sp), and germacranolides (*Frullania*, *Wiesnerella*) cause dermatitis, and have cytotoxic, piscicidal and plant growth inhibitory activities.

The last category of chemical constituents of bryophytes dealt with in the conference are those which possibly form the basis of the morphological differences in the different forms of a particular taxon. Dr H Inoue and his coworkers (Hiroshima, Japan) presented their findings on the differential distribution of sesquiterpenoids in three forms of *Plagiochila acanthophylla* subsp *japonica*. This liverwort,

P. acanthophylla subsp. *japonica* is classified into four formae: fo. *japonica*, fo. *fragilis*, fo. *robusta* and fo. *oblongifolia*. Gas chromatographic and mass spectrometric analysis of sesquiterpenoids in these forms revealed the presence of four main sesquiterpenoids, β-pompene, maalioxide, bicyclohumulenone and cyclocolorenone. Sharp differences were observed in the composition of these sesquiterpenes. Form *japonica* contained all the four components, form *fragilis* had three components other than cyclocolorenone, and form *robusta* contained only β-pompene and maalioxide.

In addition to Dr Bhatla's participation, Dr N V Biradar Reader, Department of Botany, University of Poona and Dr Kavita Mehra, Senior Scientific Officer, DST, New Delhi were also sent by INSA as delegates to the above conference. Dr Biradar's contribution in the conference was on the systematic position of the genus *Plagiochasma* and its various members in India with special reference to a new species from Western ghats of Maharashtra. He recorded a new species from Purandhar near Poona. The detailed study reveals that the present species shows certain combining features of *Marchantia*, on one hand and with *Reboulia*, *Mannia*, *Asterella* and *Cryptomitrium* on the other hand. With this view the present species is taken as a connecting link of the various members of Marchantiales through *Marchantia*, *Reboulia* and species of *Plagiochasma*. Dr Mehra showed the types of sex organs induced in Bartramidula bartramioides in cultural conditions. In this moss sex organs are induced on the basal medium. Its behaviour on the two types of nutrient media: semisolid and liquid was compared. It was observed that the response in terms of number of gametangia (sex organs) induced per culture, as well as the time taken in induction, was much better in liquid medium. Growth regulators and chelating agents affected the number of gametangia produced per culture. Indole-3-acetic acid and 6-furfury laminopurine inhibited the response, whereas gibberellic acid enhanced the number of gametangia at 10^{-8} to 10^{-5}. The chelating agents, EDDHA, EDTA and salicylic acid stimulated the responses with in optimal at 10^{-8}.

Conclusions

The papers presented in the conference gave a new outlook to the researches being undertaken on different aspects of bryophytes. Subsequent discussions have lead to specifying the major thrust areas for future lines of investigations. Some of the important conclusions drawn in the conference on different aspects of bryological researches, are as follows :

1. The foundation for any study of the systematics of bryophytes must be an extensive and intensive analysis of interpopulational variation in structure. Professor S W Greene (Reading, UK) stressed the growing need to develop data banks for bryophyte systematics. In addition there should be subsequent investigations that include analyses based upon cytological, genetical, chemical and ecological evidences. There is great potential for studies of interrelationships among various taxa of bryophytes, and there are several approaches to analysis of the data, including phenetics, evolutionary and cladistic methodologies. Various computer programs are available for carrying out such analyses readily.

More extensive application of these techniques in systematics would greatly enhance the standard of research (Professor D G Harton; Edmonton, Canada).

2. The phylogenetic position of bryophytes has thus far been worked out most extensively using morphological and anatomical features. Recent investigations have stressed the need for biochemical investigations as promising tools for studying the evolutionary trends in bryophytes. Deeper investigations should be carried out to identify the critical biochemical components of the morphoregulatory system that function to suppress the development of specific morphological structures.

3. The work done so far on the ecological importance of bryophytes has revealed that they act as promising biomonitors of population and bioaccumulators of toxic doses of heavy metals. They offer many advantages over higher plants for such investigations. Stress should be laid for investigating mosses from this point of view.

4. Dealing with modern aspects of understanding the physiological and biochemical regulation of morphogenesis in mosses, it is felt that environmental factors, particularly light, plays an important role in controling the growth and differentiation. Since it ultimately affects the plant processes by varying the metabolic activities, there is a need to investigate which photoreceptors are responsible for the perception of light stimulus.

Resolution recommended by the Resolution Committee for the World Conference of Bryology, Tokyo

Resolution 1

IAB should sponsor an international meeting every two or three years. The emphasis of these meeting should be on new research in all areas of bryology.

Resolution 2

There is an urgent need for a comprehensive bryophyte flora of tropical Africa. IAB encourages the setting up of a Committee with an editor and editorial board to draw up plans for such a flora and to seek funds for financing such a project.

Resolution 3

Bryology should integrate with other sessions by discipline in the International Botanical Conference at Berlin, in addition to sponsoring its own symposia, which should be planned to attract both bryologists and researchers in other disciplines.

Resolution 4

There should be an inexpensive reprinting of important bryological works currently unavailable to may bryologists, as has recently been done by the Missouri Botanical Garden.

Resolution 5

In many areas of the world, especially the tropics, important bryophyte

habitats are currently being destroyed. It is urgent that bryologists make comprehensive collections in such exploited areas. IAB should play a role in the identification of such "endangered" areas, in the encouragement of cooperative collecting efforts by appropriate bryologists, and in making the collections available to researchers.

Resolution 6

Steps should be taken to facilitate the completion of *Index Muscorum*, both the publication of the 11 year supplement, 1963–1973, and the bibliography to the whole work.

GENETIC ENGINEERING OF PLANTS : A REPORT*

Dr B B Biswas participated in the meeting on Genetic Engineering of Plants held in Washington DC from May 23–24, 1983. This convocation on Genetic Engineering of Plants has been organized by US National Academy of Sciences together with National Science Foundation (US). It has been sponsored by the Board on Agriculture of the National Research Council and the Council for Research Planning in Biological Sciences Inc. This meeting was held with the objective of intensifying genetic engineering on agricultural research and reviewing the achievements so far made on this aspect.

Welcome address was given by Dr W A Rosenblith, Foreign Secretary, National Academy of Science (US), introductory remarks were made by Dr G A Keyworth and Dr G E Brown Jr. National and international perspectives of agricultural research were discussed by Drs O Bentley and W D Hopper respectively. New sets of scientific development for productivity ie gene structure, organization and functions and practical application of these in production system will have to be considered. For developing countries (a) extension of traditional agriculture in new lands, (b) cultivation of new varieties of wheat and rice, (c) irrigation, (d) world bank investment for agriculture, (e) development of infrastructure, bank for biological material, light harvesting, nitrogen fixation, live stock vaccine production should be stressed and (f) major impact of genetic engineering in agriculture should also be worked out. Within another 25 years food production will have to be doubled. Industries should now be aimed at life science based products in order to achieve this. Much emphasis was given to industrial development using the emerging new science such as genetic engineering and biotechnology. Frequent scientific meetings with the Governmental and industrial agencies are advocated in order to delineate the role of public and private sectors in the new field of biotechnology. Attention may also be drawn in order to formulate regulations for transfer of technology from laboratory to the field with least disturbance to the environment. University, in general, should take up the scientific issue in each social set up for high standard education and quality production as far as man power is concerned. At the same time, attention is also drawn to prevent any depletion of talents from the university to the new technology.

Scientific meeting started with an overview of genetic engineering especially with plants. Advantages and disadvantages to work with the plant system were pointed out. Stage specific elements to control genes, sets of reading frames and vectors for monocot are to be investigated adequately so that the expression of

*Based on the delegation report of Dr B B Biswas, Chairman, Deptt of Biochemistry, Bose Institute, Calcutta.

genes in the plant cell can be understood properly. Therefore, scientific sessions were oriented on (*i*) gene structure, function and genetic transformation, (*ii*) somaclonal variation, cell selection and genotype improvement, (*iii*) introduction of herbicide resistance into crops and (*iv*) organisms in the rhizosphere and nitrogen fixing organisms.

The following research areas were discussed inview of important contributions and future applications for crop improvement.

(a) Genome structure and gene expression in plants:

Basic to all plant science research is an understanding of the genetic information system that controls plants growth and function. This entails the identificatian and isolation of specific genes in plants, the development of techniques for inserting DNA of other plants and organisms into plant cells and the establishment of *in vitro* system that will permit the genetic expression of such inserted genes.

(b) Plant developmental biology:

Studies on the regulation of gene expression in plants will greatly aid in an understanding of the control and development of form and function in plants.

(c) Plant and pest interaction:

The molecular mechanisms that control virulence in plant pathogens and the related resistance that can be established in crop cultivars are to be studied carefully using the rDNA technology. Continued and accelerated work in identifying bacterial toxins is needed, alongwith the work on the action of chemicals that trigger systemic defense mechanism in host plants. Multidisciplinary studies on insect neurobiology and the chemistry of secondary plant metabolites that attract or repel insects should lead to useful applications for controlling pest insects.

(d) Organisms in rhizosphere:

Very little is known about the ecology of the organisms that inhibit the root zone. The intriguing properties of disease-suppressive soils and the growing recognition of the importance of the ubiquitous mycorrhizal fungi point to the enormous potential benefits that could be derived from intensive study of these soil organisms.

(e) Photosynthetic energy conversion and carbon metabolism:

Considerable progress has already been made on this aspect. Increased emphasis needs to be placed on research on carbon metabolism, particularly on the control of partitioning the carbohydrate products of photosynthesis throughout the plant and on the feed back effects of this partitioning on net photosynthesis.

(f) Mineral uptake, deficiencies and excesses:

The existence of crop cultivars with impaired or improved uptake of essential mineral nutrients or resistance to toxic levels of other minerals provide opportunities for applying the tools of molecular biology to understand mineral nutrition in plants in a better way.

(g) Biological nitrogen fixation:

For the last several years this aspect of work has been yielding interesting and

promising results. Selecting or devising improved strains of nitrogen fixing microbes are being continued. Many intriguing problems remain, such as why legumes do not show any yield response to nitrogen fertilizer as other crops do, how to control the wasteful loss of reducing power in the form of hydrogen gas generated by the nitrogen fixation system and how to achieve finally the transfer of nif genes directly into crop plants.

At the end of the meeting, attention has been drawn to encourage multi-disciplinary research that provides the foundation on which new focused research programmes and potential technologies are built. It is hoped that the application of genetic engineering will generate new and previously unavilable sources of desirable genetic variability that can be exploited through conventional plant breeding techniques. It has the potential for providing genetic variability that otherwise might not be obtainable through induced mutations or exotic races of the same plant species. Thus, interactions should be encouraged between scientists working with conventional plant breeding techniques and those engaged in genetic engineering research. Finally, the positive side of the unpredictability of research in various areas of genetic engineering needs to be emphasized. The unexpected is part of the very nature of any discovery. New knowledge acquired through advances in genetic engineering together with the factor of nonpredictability, could likewise lead to major new developments in modern agriculture in near future. The opinion of the house is that this type of agricultural research should be funded heavily by both the Governmental and other private agencies.

INTERNATIONAL SYMPOSIUM ON OPTICAL WAVEGUIDE SCIENCES—A REPORT*

Shri Arun Kumar participated in the International Symposium on Optical Waveguide Sciences held in Kweilin, China from June 20–23, 1983. It was sponsored by the Chinese Institute of Electronics (CIE), China. Professor Huang Hung-chia (Chairman, Society of Microwaves, CIE, China) was the host co-chairman and Professor A W Snyder (Australian National University, Australia) was the overseas co-chairman of this symposium. About three hundred scientists from fifteen different countries had participated. A total of 82 papers were presented in eleven technical sessions which covered mainly the following five subject areas: Educational Aspects of Optical Waveguides; Optical Waveguide Systems; Opical Waveguide Theory and Practice; Single Mode Optical Fibres and Planer Optical Waveguides. Apart from these technical sessions there were two panel sessions conducted on 23rd June, one on "Education in Optical Waveguide Sciences" and the other on "Single Polarization Single Mode (SPSM) Optical Fibers"

A unique feature of the symposium was its intent to integrate the educational, industrial and research aspects relating to optical waveguides. The educational aspect is quite important for teaching the college students as well as for transferring the wide variety of transmission theories and technical information on optical waveguides to the industry ie to the designers, manufacturers and technicians etc who are the actual makers and/or users of the optical waveguides but who may not have a great interest in mathematics and abstract concepts.

Education oriented papers were presented in the opening session of the symposium which was attended by all the participants. Dr B P Pal of IIT Delhi presented a paper which proposed a contemporary course on Optical not be a significant problem for bit-rates less than 1G bit/s. To reduce polarisation dispersion still further for higher bit rates systems, the spun perform technique looks promising.

Apart from this a large number of papers were presented on optical waveguide theory. These papers discuss the new methods of obtaining the various propagation characteristics of optical waveguides.

The delegate presented a reseaech paper entitled 'Birefringence in Weakly Guiding Highly Elliptical Core Fibers' at the symposium. Such fibers are one type of single polarisation single mode fibers which are used to maintain the state of polarisation of light along the fiber. Single polarisation single mode fibers have large applications in heterodyne fiber optic systems, fiber optic sensors and in

* Based on the delegation report of Sh Arun Kumar, Department of Physis, IIT, Delhi.

coupling with polarisation sensitive integrated optics. In their paper, they have developed a simple first order perturbation approach to study the birefringence of highly elliptical core fibers. It is found that the results for the birefringence obtained by the present analysis agree very well with the results obtained by exact numerical calculations.

(B) New developments resulting from the conference:

(i) A comparision of monomode fiber systems designed to operate in the 1300nm and/or 1500nm transmission windows shows that 1300nm monomode fiber technology has great attraction for land or undersea use in the immediate future. Very long repeater sections, of the order of 30 km are possible with bit rates of 140 or 565 m bit/sec today. Advances in regenerator technology can extend this capability still further opening up the possibility of higher bit rate, longer repeater spacing or both. It seems that monomode optical systems will increasingly dominate long haul intercity high bit rate cable transmission as the decade progresses and there will be a shift in R & D towards very advanced regenerator development waveguide. Dr H Block of Netherlands had presented a source solution approach to optical waveguides, while Professor Huang Hung-chia presented a microwave-approach to optical waveguides. Both the papers attempted in depth treatment of optical waveguides from different view points and by way of different mathematical procedures. Technical research papers were presented in parallel sessions such that each participant could attend only three technical sessions apart from the opening session. The sessions which the delegate attended were mainly on Single Mode Fibers and the academic highlights of these sessions are given below:

Dr Midwinter of British Telecom Research Laboratories reviewed and compared the present various monomode fiber systems used for Longwave Transmission Systems. Results were presented on systems designed to operate in the 1300 nm as well as 1500 nm transmission windows. Either of the systems has some advantages and some disadvantages. For example, systems designed to have zero of dispersion in the 1300 nm window use weakely guiding fibers. These fibers are very susceptible to microbending loss on cabling. However, it has a low dopant concentration in the core and hence low Rayleigh scattering. In addition, the spot size will be relatively large leading to low splice losses. On the other hand systems designed to operate into the 1500 nm window use fibers having high index difference, smaller core diameter and tightly guided field which are less susceptible to microbending loss. However, these, fibers have high Rayleigh scattering and these are more sensitive to splicing loss due to smaller mode size.

Propagation characteristics of both linearly as well as circularly single polarization single mode fibers were presented by T Okoshi of Japan and compared. These SPSM fibers included the recently proposed side tunnel fibers (by T Okoshi and coworkers, Japan) and the absolutely SPSM fiber proposed by A W Snyder of Australia and fabricated by Dr Payne of Southampton University, England.

Scientists from CSELT, Italy have shown that the accurate chromatic

dispersion measurement are feasible in single mode fibers making use of sinusoidally modulated incoherent sources. They have extended this technique in the long wavelength range, thus allowing the accurate determination of the zero chromatic dispersion wavelength in an easy way and with simple instrumentation.

A new method of measuring the refractive index profile of a single-mode fiber was presented by K Morishita of Japan. In this method the profile is determined by comparing the near field intensity pattern of the test fiber with a fiber of known refractive index profile. New developments in heterodyne/coherent optical communication schemes were presented by T Okoshi of Japan. He has also outlined the technical problems which must be overcome before a practical heterodyne system is relised in future. Experimental results obtained from a coherent transmission system operating with conventional circular core fibers at British Telecom Research Laboratories (BTRL), UK were also presented. These results indicate that polarization mode dispersion would and away from more sophisticated fibre developments.

(ii) There is still a debate on what amount of birefringence is really needed in actual fiber communication systems. A resent report from the BTRL says that the polarization on state in a 'cabled' fiber is not so unstable. The time constant of fluctuation is more than several hours. If so, the use of the circularly SPSM fiber becomes more attractive because it allows easy connection and splicing at the sacrifice of a weaker birefringence.

VIII WORLD CONGRESS OF PLASTIC SURGERY : A REPORT*

Dr N C Madan attended the VIII World Congress of Plastic Surgery held in Montreal, Canada from June 26—July 1, 1983. The congress brought together plastic surgeons from world over who presented and delibrated on the latest developments in this field. Free composite transfer of tissues by micro surgical techniques, refinements in myo-cutaneous flaps and reimplantation of limbs and many other important aspects of plastic surgery were discussed. Exciting concepts of simple technique of tissue converge by fascio-cutaneous flaps were presented and details of their vascular pattern and territories were discussed. A great deal of work in the field of cranip-facial surgery was presented. Dr Madan's contribution was in the field of management of advanced lymphedema with special reference to elephantiasis. A simplified treatment model was suggested. A new simple surgical technique consisting of excision of the diseased panniculus of fibrosed subcutaneous tissue only was presented. The results in 30 cases with 5 years follow up revealed excellent functional and aesthetic improvements. Improvement of lymphatic function was shown by using RHISA clearance studies.

Some of the recent developments of great importance are as follows:

(*a*) *Breast reconstruction following cancer surgery:* Commonest surgical treatment of cancer breast is total mastectomy, which causes a great deal of psychological trauma to the patient. Enough evidence was shown to project early breast reconstruction, within six months after mastectomy. Many newer flaps eg lower and upper abdominal myo-cutaneous flaps were shown to be giving better results than more convential flaps.

Inflatable prosthesis to produce skin expansion has been found to be of great value.

(*b*) *Fascio-cutaneous flaps:* A great deal of material was presented about this exciting field. Deep fascia has for long been neglected. Study of its vasculature reveal that there exists a rich plexus of vessels on either side of the deep fascia, and that this is enough to plan fascio cutaneous flaps avoiding taking of muscles. If 1976–1983 were years of the myo-cutaneous flaps, 1983 onward may well belong to fascio-cutaneous flaps.

(*c*) *Facial paralysis:* Numerous studies were presented to show that the best results in cases of facial paralysis are achieved by cross facial nerve sutures. Numerous different techniques with and without additional nerve or muscle grafts were presented.

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* Based on the delegation report of Dr N C Madan, Associate Professor, Department of Surgery, All India Institute of Medical Sciences, New Delhi-110029.

(*d*) *Argon laser:* Usefulness of Co_2 argon laser in management of different types of haemangiomas was presented. Different theories about the basic changes produced by lasers in tissues were presented. Overall view was that rather than photoaggulation of the cutaneous vessels, it produces its beneficial effects by producing controlled burn.

Argon laser was also shown to benefit cases of pigmentary disorders eg leukoderma.

(*e*) *Body sculpturing:* Suction lipectomy was shown to be a very exciting new technique of contouring localised lipodystrophies. It was shown to give excellent cosmetic results and is bound to become an extremely popular operation.

(*f*) *Inflatable prosthesis:* It is a new development of great merit. Different shapes and forms of silicon inflatable prosthesis have been made. Wherever skin expansion is desired, a suitable shaped prosthesis is implanted and increasingly inflated to strech the skin, overcoming the skin shortage.

(*g*) *Haemangiomas:* New concepts in the pathogensis of haemangiomas based on the basic cellular biological behaviour of the endothelium, were presented. High levels of serum estradiol (E-2) and its specific receptors binding capacity have been seen in true haemangiomas which are going to regress.

Steroids both systemic and intralesional were shown to benefit these cases. This is probably due to its influence on estradiol 17-B binding activity.

(*h*) *Limb and digital reimplantation:* Organisation of reimplantation team protocols for outlying hospitals, transportation criteria for cases suitable for reimplantation and the surgical techniques were discussed in a panel discussion. It was obvious that if the patient comes with in 4-8 hrs, all limbs or major parts of the digits should be reimplanted.

(*i*) *Burns:* Many papers on current burn wound research focussing on the dynamics of deep dermal injury, were presented. Effect of deep dermal injury on zone of stasis of pharmacological agents like steroids, prostaglandin inhibitors and hyperberic oxygen in more rapid re-epithelialization with less fibrosis were highlighted.

A great deal of scientific data was presented on the nature and role of myofibroblasts in the wound healing.

SHORT COMMUNICATIONS

Dr S P SANGAL, Laxminarayan Institute of Technology, Nagpur attended the XVI RARE EARTH RESEARCH CONFERENCE held at Florida State University, Tallahassee, Florida, USA from April 18–21, 1983. The paper "The Investigation of Coordination Compounds of Trivalent Lanthanide Ions with Trans 1, 2-Diamino-Cyclohexane Tetraacetic Acid (CyDTA)" by H D Daga, S U Lakhani and S P Sangal was presented by the delegate during the poster session B on Solution and Geochemistry. This was the only paper on the determination of stability constants of ternary complexes of rare earths using p*H*-titration technique. The results presented showed that the mixed ligand complexes of rare earths using CyDTA as primary ligand and DHNSA, Tiron or PYC as secondary ligands followed the stability constant order Ce Eu Gd Dy Er Tm Yb. Similar order in the values of stability constants of rare earths is observed with binary complexes of CyDTA or Tiron, DHNSA PYC. The present investigation shows that the rare earths have coordination number more than six in solution also.

Most of the papers presented during the conference were of academic interest and added new data to the scientific literature in the physics and chemistry of rare earths. The various papers in the session of Comparative Chemistry and Physics of Actinides and Lanthanides were of great importance as they provided better understanding of the chemistry of transuranic elements which are of great importance in the atomic energy programmes. The preparation and properties of electrically conducting ceramics containing rare earths, preparation and characteristics of new polycrystalline materials for crystal growth of Gallium-Gadolinium garnets were the papers presented in the session of Inorganic Materials and are very useful in the industrial application of rare earths. The use of lanthanides in bioinorganics are of great importance such as use of terbium III to access differences in the structure of DNA, lanthanide complexes of adriamycin, proton and carbon, NMR characterization of lanthanide ion complex of thymopoietin 32–36 and lanthanide ion luminescence probes of biomolecular structure. The papers, in the Technology and Applications session, on the application of rare earth doped materials, intermetallic compounds for permanent magnets, current status and future trends, and rare earth/sulphur interaction during steel making and their effect on properties, rare earth make galvanizing fantastic and the effect of fluoride preparation on the purity of the rare earth metals are of great significance towards the new applications of rare earths.

The black sand of Kerala is a storehouse of many chemicals. It contains many minerals like illmenite, zircon, rutile, sillimanite, monazite, quartz and garnet.

Monazite is one of the most important minerals for the production of thorium. Rare earths are obtained as a byproduct. The Indian Rare Earths, Allwaye is the only company producing rare earths. The various uses to which the rare earths are put to are in the atomic energy programme, in glass industry for glass polishing materials, opthalmic glasses, arc carbon, television industry and laser glasses. Since not many industries in India require rare earths, most of it produced in India is exported to Japan and the USA. In order to develop rare earth industry in India new applications of rare earth must be found. One of the important new applications is rare earth/sulphur interactions during steel making. During the present days of energy crisis, Indian conditions are most suitable for the use of solar energy. The possible use of rare earth doped glasses or crystals in connection with fluorescent solar concentrators, light source for fiber optics and glass lasers is of great importance.

Dr P DHAR, Professor, Department of Electrical Communication Engg, IIT, Kharagpur, attended THE INTERNATIONAL SYMPOSIUM ON SATELLITE AND COMPUTER COMMUNICATIONS held at Versailles, France from April 27–29, 1983. This international symposium was held with the purpose of presenting the use of computers in satellite communication systems on the one hand, the improvements of computer to computer communications by incorporating modern satellite communication technology on the other hand. The main goal of the symposium was to highlight the recent trends in satellite and computer communication systems in which both satellite and computer technologies are effectively used. The delegate presented a paper that points out the use of a satellite communication like in a terrestrial/satellite (mixed media) computer communication network. We have developed an algorithm which helps to design such a network in a cost-effective manner. This work created interest among the participants because it is of importance for mixed media network design perticularly with a domestic satellite.

The design, management and protocol aspects of packet broadcasting systems were discussed. The multiaccess techniques in such systems were of great interest to many participants. The design and development of different protocol layers in a computer network was one of the main attractions in the symposium. The various aspects of local area networks were also discussed. The symposium were concluded with the recommendation that the telecommunication satellite should be used effectively in various systems including computer communications and a lot of research and development is an immediate need.

A good amount of research in satellite and computer communication is going on in India at different places. India is developing her own telecommunication satellite technology. The uses of computer, digital communication and computer technology are almost well established in India. A lot of research and development works are also going on in different institutes, universities and organizations.

Scientists and engineers are aware of remote computing, various other distributed computer applications including distributed data bases and application of computer in communication systems. The efforts are being directed towards these.

The different research results exposed in the symposium may be investigated in India for useful purposes. The satellite and computer may be combinedly used for data transfer, data base access, resources sharing and communication. Besides these, local area networks may be a good innovation in India. Protocol studies will be required for all these works. The research contribution which the delegate has presented in the symposium has a very good impact on the design of computer communication network in India. If a domestic satellite is available for such a network then a mixed media network can be designed in a case effective manner. A small or medium sized zonal network as well as a network for the whole country can be set up using the satellite transponder facillity. The algorithm and the other results given in delegates' paper could be very much helpful for these purposes.

Dr H P PATRA, Department of Geology and Geophysics, Indian Institute of Technology, Kharagpur participated in the INTERNATIONAL SYMPOSIUM ON METHODS AND INSTRUMENTATION FOR INVESTIGATION OF GROUNDWATER SYSTEM at Leeuwenhorst Congress Centre, Noordwijkerhout (Near Hague), The Netherlands from May 2–6, 1983. Development in groundwater exploration and investigation of groundwater system have gained importance over the past few years. Lack of proper water management may often lead to environmental threat and water quality degradation. It is also thought that groundwater management and related design activities suffer from inadequate data of quality. Data collection on groundwater systems will have top priority as lack of information adds uncertainty to prediction of behaviour of the groundwater systems with regard to water quantity and quality variables. The purpose of the symposium was to give support to data collecting activities by studying methods and instrumentation for the investigation of groundwater systems, in detail.

The deliberations of the symposium was organised under three themes, namely (i) Criteria for optimal sampling strategies, (ii) Methods and techniques for the determination of geohydrological parameters and variables and (iii) Instrumentation for acquisition and processing of data, besides some introductory papers on groundwater systems. The paper entitled "Electromagnetic Sensing for Groundwater at Shallow Depths in Hard Formations" was presented by the delegate under the second theme who also participated in discussions in the symposium.

The delegate presented the results of theoretical investigations on a new multifrequency sounding technique called Central Frequency Sounding (CFS), the developments in which were very much appreciated by the participants in the symposium. In the new approach, digital linear filter technique had been applied for computation of CPS response curves over a multi-layer earth. The presented

curves have made a complete analysis of data possible in terms of resolution of layer parameters, detectability of intermediate layers and equivalence conditions.

Analysis of data put the depth of investigation approximately at half the loop radius, Response characteristic for frequency-domain and time-domain CFS in terms of resolution, detectability and equivalence confirmed the applicability of on the approach for shallow groundwater sensing in hard formations. The method will also be useful in detailing ore bodies and other underground conductors.

It was established that three-layer H-type models with poor equivalence formed well resolved and well detected targets.

It was concluded that CFS might play an important role in delineating conductors and watersaturated zones within hard rock areas.

It was pointed out that the development of a compact commercial instrument for field surveys would lead to location of sources of groundwater in highly resistive formations throughout the world, at a very cheap rate.

Dr A KALANIDHI, Asstt Professor of Mechanical Engineering, College of Engineering, Guindy, Madras attened IASTED INTERNATIONAL SYMPOSIUM ENERGY 83 at San Francisco Hilton and Tower San Francisco, USA from May 16-18, 1983. The delegate presented the paper on 'Cryogenic Technology and the Energy Crisis'.

The environmental desirability and the eventual economic necessity of replacing fossil fuels with synthetic fuels is obvious. Reserves of oil and natural gas have estimated life time of the order of 50 years and coal, the dirtiest fossil fuel, has reserves to last about 200 years longer. Using cryogenic techniques and renewable sources, hydrogen in liquid form can easily substitute the fossil fuel. Liquid hydrogen (LH_2) can easily be transported and used for both ground and air transport systems. The development of LH_2 storage vessels and transport containers have made staggering advance. In many respects, the technology of handling LH_2 is more completely developed than that of LNG or LN_2. In assessing the safety aspects of large scale handling and use of LH_2, there are more plus points. The advancement in the space programme with the use of LH_2 has derived considerable expertise in the safety aspects of LH_2. The future growth in the cryogenic industry will provide the needed economy of implementing cryogenic hydrogen for ground and air transport fuel system. The analysis through global outlook indicated that future transport energy has to be dependent on LH_2 technology.

Economic analysis of energy situation is very essential in the present context of world energy crisis. Considerable number of papers on the economic analysis, starting from agricultural energy conservation, coal mining transportation, natural gas recovery and shipment to nuclear energy production and nuclear waste

disposal were considered and given importance about the alternative sources of energy to meet the future energy demand.

Alternative sources of energy and energy carrier have to be developed to meet energy requirements of transportation industry and other energy consuming devices.

A range of topics were discussed at the symposium such as fluidized bed energy storage and controlled cooling, energy conservation in a blast furnace hearth, stratified house heating system, a simplified method for petroleum reservoir history matching, thermal storage tank modelling, statistical weather modelling for energy system, availability analysis of a shut down heat removal system, international energy projections, role of cryogenic technology in solving future energy crisis, energy conservation in agriculture, design and test of new generation methanol vehicle, residential electricity demand and elasticity variation due to seasonality, limited liability for advanced energy technologies, the practice of technological risk assessment, stirling cycle heat pumps—future reality. A perspective of the choice available for photo electric power systems and such other energy models were discussed.

It is to be planned that the available resources of energy on the subcontinent be effectively, economically and skilfully tapped for useful purpose for which the cryogenic technology has to be developed. Still this technology is at the laboratory level. The effective use of LN_2 in artificial insemenation, fluidized bed freezing of fish, prawns, lobsters etc. using LN_2 technology, providing efficient transport tankers for the transporation of cryogenic liquids such as LNG and LH_2, effective utilisation of LH_2 for transport industry, redesigning the present air crafts, automobiles and ships for the use of LH_2 for movement, development super conducting cables for transport of electricity and such other technology develop through cryogenics would solve the energy problem of the Indian sub continent.

Dr G N MEHTA, Lecturer, Chemistry Department, SVR College of Engineering and Technology, Surat participated in the INTERNATIONAL CONFERENCE ON CORROSION INHIBITION organised by National Association of Corrosion Engineers, Houston, Texas USA, in Hitton Inn, North Central Expressway, Mockingbird, Dallas, Texas from 16–20th May, 1983. This conference was organized by the National Association of Corrosion Engineers (NACE) which is one of the most reputed organizations dealing with the development and the application of corrosion science and technology in the field of corrosion control. Dr Mehta presented his paper "Impedance Study of Acid Corrosion of Iron and Steel-Effect of Thiourea". The a-c impedance measurement of iron and steel in HCl and H_2SO_4 (0.1M) were made separately in the presence and absence of thiourea (H_2N–CS–NH_2) which has frequently been reported as a good inhibitor of metal

corrosion in the acidic media. This paper covered typical behaviour of thiourea; beyond lower and upper limits of (critical) concentrations, it does not inhibit but (instead) accelarates the metallic corrosion. Corrosion rate was lower in HCl than in H_2SO_4 due to effect of Cl^- ions. The performance of steel was found better than pure iron; on the surface of pure iron, in 0.1M sulphuric acid, blisters were formed in the presence of thiourea which resulted in to bites (cavities) on the surface when exposed to acid. The delegate provided the scientific explanation on the basis of sulphur activated anodic zones, presence of Cl^- ions, presence of thiourea and its reduced species.

Recommendations in the conference were made for further interaction and exchange of real problems of corrosion between industry and an academic / research institute. Main conclusion of the conference indicated the basic necessity of R & D work in the laboratory prior to go for any field application of any particular corrosion problem. The Rosenfield Memorial Lecture by Madam Susan Smialowska and the distinction made for interface and interphase inhibitors by Profeseor Lorenz were quite noteworthy whereas 'Corrosion Inhibition of Steel Part–I and Part–II' by B E Andrew of Australia were of highly practical importance. Professor G Trabanelli of University of Ferrara, Italy presented two highly impressive papers on corrosion inhibition by the organic additives especially on the use of slow strain rate technique to study inhibition of stress corrosion cracking.

Research work on corrosion inhibition in India is being mainly carried out at Central Electrochemical Research Institute, Karaikudi. NCML, IIT and BARC in Bombay, National Defence Research Laboratory, Kanpur, BHU, Varanasi, Rajasthan University, Jaipur and in many more academic institutions and research laboratories of chemical and peripheral industries. IISc, Bangalore also provides very good research informations being done there. Corrosion is a very serious problem in any industry where a metal, chemical and water is being used and as such no industry left without facing corrosion problem. Naturally, it brings about a big direct and/or indirect losses of money and manpower. It, thus, supress the industrial growth of the country. Topics covered on the corrosion inhibition in this conference were of most recent developments in theories and practice. It will have a remarkable impact on the improvement of present status of knowledge in the area of specialization.

Dr P BALARAM, Molecular Biophysics Unit, Indian Institute of Science, Bangalore participated in the EIGHTH AMERICAN PEPTIDE SYMPOSIUM at Tucson, Arizona, USA from May 22–27. This conference is the most important international meeting in the area of peptide chemistry. The delegate was invited to present a lecture summarizing results obtained in his laboratory in the area of trans-membrane channel forming peptides. This lecture was part of a special symposium

devoted to membrane active peptides and was the first time that the results from Bangalore were presented in an international meeting.

The conference dealt with several important areas in contemporary peptide chemistry. These included sessions on the following areas: (a) Synthesis of Peptides, (b) Biosynthesis and Post Translational Processing of Peptides, (c) Mechanisms of Peptide Hormone Action, (d) Neuropeptides and Behaviour, (e) Structural and Conformational Considerations in the Design of Biologically Active Peptides, (f) Peptide Inhibitors of Proteases, (g) Membrane Active Peptides and Ion Transport, (h) Peptide Purification and Analysis, (i) Conformational and Dynamic Properties of Peptides—Computer Graphics and (j) Peptides as Potential Drugs and Pharmaceuticals.

DR RAKESH SRIVASTAVA, Scientist, Chemical Engineering Division, Regional Research Laboratory, Hyderabad attended the WORLD CHROMATOGRAPHY SPECTROSCOPY CONFERENCE 1983 at Strand Palace Hotel, London, UK from June 20–21, 1983. The objective of the conference was to bring together participants from various countries working in several different areas of chromatography/spectroscopy. Papers dealing with various aspects of chromatography eg, gas chromatography, liquid chromatography, TLC, HPLC, gel permeation, column chromatography, equipment and design, theory and applications etc, were solicited. Similarly, several areas of spectroscopy were also covered, eg, infrared and emission spectroscopy, spectrochemical analysis, NMR, AAS, mass spectrometry, x-ray spectroscopy, special analytical techniques and applications etc. It was intended to provide an opportunity to the participants to discuss and exchange views on the subjects of common interest among themselves. It enabled participants to learn application of newer techniques and theoretical advancement for use in their own laboratories. The conference also resulted in forming new acquaintances and friendships among the international scientific community.

The delegate was invited to chair one technical session and to contribute a paper "Properties Determination Using Gas Chromatography: Diffusion Coefficients and Infinite Dilution Activity Coefficients". The paper described the use of gas chromatography in the wider context of measuring thermophysical and transport properties needed for many technological application. The ease and rapidity of the measurements was underlined. Inary gas phase diffusion coefficients of fifteen organic vapours in nitrogen carrier were reported. The technique of obtaining infinite dilution activity coefficient was described and experimental values of some organic solutes interacting with ester stationary phase (di-n-decyl phthalate) were reported.

Developments in thermodynamic estimation of the behaviour of the selected homologous series, physico chemical problems in separation of rare elements mixtures, measurement of diffusion coefficients and infinite dilution activity coefficients and their temperature variations, influence of temperature on porous

structure of supporting materials for chromatography, studies in chemical reaction kinetics were reported by some of the participants. Similar development were reported in other areas of chromatography and spectroscopy. A more recent development of using supercritical mobile phase in gas chromatography was indicated in a plenary lecture. This may turn out to be particultarly useful in preparative gas chromatography. The advantages and experimental problems associated with this technique were outlined. There was one plenary lecture "Present and Future Chromatography" by Professor Jan K Rozylo, Meria Curie-Sklodowska University, Lublin, Poland.

Any developing country today, India included, faces a grave problem because of the ever-incresaing prices of energy. A substantial part of the wealth generated by the hard toil of the people of the country, which could otherwise be usefully utilized in enhancing present production capacity, to overcome the economic problems of the country, has to be spent in footing the increased import bills of fuels and other energy producing meterials. Therefore the country has to find (*a*) alternate indigeneous energy sources and (*b*) make the existing production process energy efficient.

All these generalizations are of extreme importance to chemical industries in particular. Keeping these factors in mind, it is necessary that the modern design of chemical process equipments emphasizes the need of accurate values of physical, thermodynamic and transport properties of the substances in order to reduce the overdesign and make the process energy efficient. Towards this end, the Chemical Engineering Division at Regional Research Laboratory, Hyderabad, has identified a project "Properties Evaluation". This involves accurate experimental determination, correlation and prediction of some of the important thermophysical and transport properties. The paper presented at the conference has resulted from efforts in in measuring these properties using gas chromatographic techniques. The delegate's group, for the first time, has taken up the research in this area in our country. This exchange of ideas and contacts with participants of other countries will definitely provide renewed impetus to research.

List of delegates selected by the Indian National Science Academy under its ICSU programme (1983-84)

S No.	*Name of the Scientist & address*	*Name of the General Assembly/ conference, venue and date*
1	2	3
	International Astronomical Union (IAU)	
	Core Delegation	
1.	Dr P Vivekananda Rao Astronomy Deptt Osmania University Hyderabad	IAU Symposium on Double Star Physical Properties and Genetic Relations, at Lembar, Java, Indonesia from 3–7 June, 1983.
2.	Dr K D Abhyankar Osmania University, Hyderabad	—do—
3.	Professor A V Ravindran Indian Instt of Astrophysics Bangalore	—do—
4.	Dr S Ananthakrishnan Radio Astronomy Centre (TIFR) Ootacamund	IAU Symp No 110 on VLBI & Compact Radio Sources at Blogne, Italy from 27 June to 1 July, 1983.
5.	Dr S Kandaswamy TIFR, Bombay	—do—
6.	Professor R V Bhonsle Physical Research Laboratory Ahmedabad	—do—
7.	Professor H S Gurm Panjab University, Chandigarh	IAU Symp No 105 on Observational Tests of Stellar Evolution at Geneva, Switzerland from 12–16 Sept, 1983. and Rapid Variability of Early Type Stars at Nvar, Yugoslavia from 18–22 Sept, 1983.
8.	Dr Farooq Ahmad Kashmir University Srinagar	IAU Symp on Clusters & Groups of Galaxies at Trieste, Italy from 13–15 Sept, 1983.

1	2	3
9.	Dr S C Joshi U P State Observatory Nainital	IAU Symp No 105 on Observational Tests of the Stellar Evolution at Geneva, Switzerland from 12–16 Sept, 1983.
10.	Dr V S Krishnan Indian Instt of Astrophysics Banglore	IAU Symp No 107 on Unstable Current Systems and Plasma Instabilities in Astrophysics at Maryland, USA from 8–11 August, 1983.
11.	Professor S K Trehan Panjab University, Chandigarh	—do—
12.	Shri A Ray TIFR, Bombay	—do—

International Union of Biological Sciences (IUBS)

1.	Professor C V Subramanian Director Centre for advanced Study in Botany, Madras University, Madras-600005	III Intl Mycological Congress at Tokyo, Japan from 28th Aug to 3 Sept, 1983.
2.	Dr (Mrs) G R Ghosh President Indian Mycological Society NCERT New Delhi	—do—
3.	Dr D D Awasthi Reader in Botany Lucknow University Lucknow	—do—
4.	Dr A K Sarbhoy Chief Mycologist Div of Mycology & Plant Pathology, IARI New Delhi	—do—
5.	Dr K Natarajan, Reader University Botany Laboratory, Madras	—do—

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6.	Dr P Rama Rao Reader in Biology Osmania University Hyderabad	IV Intl Congress of Plant Pathology at Melbourne, Australia from Aug 17–24, 1983.
7.	Dr S P Raychaudhuri C-52, Inderpuri New Delhi	—do—
8.	Dr S N Bhargava 28, Dayanad Marg Allahabad	—do—

International Union of Pure and Applied Chemistry (IUPAC)

Core Delegation

1.	Professor C N R Rao Indian Instt of Science Bangalore	XXXII IUPAC General Assembly at Lyngby, Denmark from 18–26 August, 1983.
2.	Professor D V S Jain Deptt of Chemistry Panjab University Chandigarh	—do—
3.	Dr C Kalidas Deptt of Chemistry IIT, Madras	—do—
4.	Dr K V Sane Deptt of Chemistry University of Delhi Delhi	—do—
5.	Dr S Mohan Madras Instt of Technology Madras	XXIII Colloquium on Spectroscopy at Amsterdam, Netherlands from June 26 to July 21, 1983.
6.	Dr R K Shukla Deptt of Chemistry P G College, Attara	VII Intl Conf on Chemistry Education at Montpellier, France from 21–26 August, 1983.
7.	Dr S S Krishnamurthy Deptt of Inorganic Chemistry Indian Instt of Science Bangalore	Intl Conf on Phosphorus Chemistry at Nice, France from 5–9 Sept, 1983.

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8.	Dr R C Mehrotra Professor Emeritus Deptt of Chemistry Univ of Rajasthan Jaipur-302004	XI International Conf on Organometallic Chemistry at Atlants, USA from 9–15 August, 1983.
9.	Professor S V Kessar Deptt of Chemistry Panjab University, Chandigarh	IX Intl Congress of Hetrocyclic Chemistry at Tokyo, Japan from 21–26 August, 1983.
10.	Professor S K Talpatra Chemistry Department University College of Science University of Calcutta Calcutta-700009	—do—
International Union of Crystallography (IUCr)		
1.	Shri Dinakar M Salunkhe Molecular Biophysics Unit Indian Instt of Science Bangalore-560012	International School on Crystallographic Computing at Kyoto, Japan from 18–27 August, 1983.
2.	Shri S Chakravarthy Neutron Physics Div Bhabha Atomic Research Centre, Trombay, Bombay	—do—
3.	Dr (Mrs) K G Subhadra Joshi Warangal	—do—
4.	Dr V Parthasarathy Department of Physics Bharatidasan University Tiruchirapall-620020	—do—
5.	Dr P N Kotru, Lecturer Deptt of Physics University of Jammu, Jammu	VII Intenational Conf on Crystal Growth at Stuttgart, Germany from 12–16 Sept, 1983.
Scientific Committee on Problems of the Environment (SCOPE)		
1.	Professor S C Pandeya Deptt of Bio-Sciences Saurashtra University, Rajkot	Intl Symp on Environmental Considerations in Rural Development at Cairo, Egypt from 16–21 April, 1983.
International Union of Geodesy and Geophysics (IUGG)		
1.	Professor D Lal, Director Physical Research Laboratory Navrangpura, Ahmedabad	IUGG General Assembly at Hamburg from 15–27 August, 1983.

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2.	Dr D R K Rao Indian Instt of Geomagnetism Colaba, Bombay	IUGG General Assembly at Hamburg from 15–27 August, 1983.
3.	Dr R Raghava Rao Physical Research Laboratory Navrangpura, Ahmedabad	—do—
4.	Dr C A Reddy Vikram Sarabhai Space Centre Trivandrum	—do—
5.	Dr S N Saha Geological Survey of India Shillong	—do—
6.	Dr K N Khattri Roorkee University, Roorkee	—do—
7.	Dr D Satyanarayana Andhra University, Waltair	—do—
8.	Dr P V Bhavnarayana Andhra University, Waltair	—do—
9.	Dr M L Gupta National Geophysical Res Instt Hyderabad	—do—
10.	Dr K L Kalia National Geophysical Res Instt Hyderabad	—do—
11.	Maj Gen G C Agarwal (Chief delegate, IAG)	—do—
12.	Dr H N Srivastava India Meteorological Deptt Lodi Road, New Delhi	—do—
13.	Dr V K Gaur, Director National Geophysical Res Instt Hyderabad	—do—
14.	Col M G Arur Survey of India, Dehra Dun	—do—
15.	Shri Joshi Survey of India, Dehra Dun	—do—

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16.	Dr R G Rastogi, Director Indian Instt of Geomagnetism Bombay	IUGG General Assembly at Hamburg from 15–27 August, 1983.
17.	Professor B P Singh Indian Instt of Geomagnetism Bombay	—do—
18.	Dr A C Das Physical Research Laboratory Navrangpura, Ahmedabad	—do—
19.	Dr J N Nanda Panjab University, Chandigarh	—do—
20.	Dr S K Das Director General India Meteorological Deptt Lodi Road, New Delhi	—do—
21.	Dr B H Subbaraya Physical Research Laboratory Navarangpura, Ahmedabad	—do—
22.	Dr A K Mukherji Dy Director General India Meteorological Deptt Pune	—do—
23.	Dr S K Mukherji Geological Survey of India Calcutta	—do—
24.	Dr J G Negi National Geophysical Res Instt Hyderabad	—do—
25.	Dr B D Pathak Chairman Central Ground-Water Board (Chief delegate, IAHS)	—do—
26.	Dr R N Bose Geological Survey of India	—do—
27.	Dr V D Ramamurthy Dy Director Marine Products Export Development Authority Cochin	—do—

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2.	Professor K P Sinha, Senior Professor Divn of Mathematics & Physics, Indian Instt of Sciences Bangalore	IUTAM Symp on Mechanical Behaviour of Electro-magnetic Solid Continua at Paris-France from 4–7 July, 1983.

International Mathematical Union (IMU)

1.	Professor M S Narasimhan Tata Instt of Fundamental Research, Bombay-400005	Intl Congress of Mathematicians at Warsaw, Poland 16–24 August, 1983.
2.	Professor V C Nanda Mathematics Deptt Panjab University, Chandigarh	—do—
3.	Shri R Bhatia Centre of Advanced Study in Mathematics, University of Bombay, Bombay	—do—
4.	Professor U N Singh Vice-Chancellor Allhabad University, Allahabad	—do—
5.	Professor A R Reddy Deptt of Mathematics University of Hyderabad Hyderabad	—do—
6.	Dr S Poornima	—do—
7.	Dr B L Sharma Reader in Mathematics University of Allahabad Allahabad	—do—

International Union of Pure and Applied Physics (IUPAP)

1.	Dr A R Prasana Physical Research Laboratory Ahmedabad	X Intl Conf on General Relativity & Gravitation at Padova, Italy from 4–9 July, 1983.
2.	Dr S Banerji Professor of Physics University of Burdwan Burdwan	—do—

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28.	Dr Y V Somayajulu National Physical Laboratory Hillside Road, New Delhi	IUGG General Assembly at Hamburg from 15–17 August, 1983.
29.	Dr M N Rao Physical Research Laboratory Navrangpura, Ahmedabad	—do—
30.	Dr S N Talukdar Member Exploration ONGC 9, Kaulagarh Road, Dehradun	—do—
31.	Dr R N Singh Scientist National Geophysical Research Instt (CSIR) Uppal Road, Hyderabad-500007	—do—
32.	Dr Vijya Raghava Centre for Exploration Geophysics, Osmania University, Hyderabad	—do—
33.	Professor Sulochana Gadgil Centre for Theoretical Studies Indian Institute of Science Bangalore	—do—

International Union of Geological Sciences (IUGS)

1.	Dr H P Patra Asstt Professor Indian Instt of Technology Kharagpur	Intl Symp on Methods & Instrumentation for Investigation of Ground-water System at Hague, Netherlands from 2–6 May, 1983.
2.	Dr D C Singhal Lecturer, Deptt of Earth Sciences Univ of Roorkee Roorkee (UP)	—do—

International Union of Theoretical and Applied Mechanics (IUTAM)

1.	Professor V V Athani Deptt of Electrical Engg Indian Instt of Technology Bombay	I Intl Conf on Computer Applications in Production Engg at Amsterdam, Netherlands from 25–28 April, 1983.

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3.	Professor K K Pujara Deptt of Mechnical Engg Indian Instt of Technology New Delhi	XI Intl Conf of Acoustics at Paris, France from 19–24 August, 1983.
4.	Dr (Mrs) Lali Chatteejee Research Associate Jadavpur University, Calcutta	XII Intl Conf on Physics of Electronics & Atomic Collisions at West Berlin, W Germany from July 27 to Aug 2, 1983.
5.	Professor Vijay Kumar Associate Professor Physical Research Laboratory Ahmedabad	—do—
6.	Dr S P Khare Professor & Head, Deptt of Physics, Instt of Advanced Study Meerut University, Meerut	—do—
7.	Dr B K Datta Jr Academic Member S N Bose Instt of Physical Science, 92, A P C Road, Calcutta	X Intl Conf on General Relativity & Gravitation at Padova, Italy from 4–9 July, 1983.
8.	Dr P C Vaidya Retd Professor Deptt of Mathematics Gujarat University, Ahmedabad	—do—
9.	Professor S Chandrasekharan Raman Research Instt Bangalore-560080	IUPAP conference on Thermodynamics and Statistical Physics at Edinburgh UK from 25–29 July, 1983.
International Union of Pharmacology (IUPHAR)		
1.	Professor P K Das Instt. of Medical Sciences Banaras Hindu University Varanasi	II World Conf on Clinical Pharmacology & Therapeutics at Washington DC, USA from 31 July to 5 Aug, 1983.
2.	Dr (Mrs) Swarn Nityanand CDRI, Lucknow	—do—

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3.	Dr R C Saxena K G Medical College Lucknow	2nd World Conf on Clinical Pharmacology & Therapeutics at Washington DC, USA from 31 July to 5 Aug, 1983.
4.	Dr C K Chauhan LTMG Hospital, Bombay	—do—
5.	Dr B N Dhawan Dy Director CDRI, Lucknow	—do—
6.	Dr C K Gupta G S Medical College Bombay	—do—
International Union of Radio Science (URSI)		
1.	Dr A Pramesh Rao Fellow Radio Astronomy Centre Ooty	Intl Conf on Measurement & Processing for indirect Imaging at Sydney, Australia from 30 August to 1 Sept, 1983.
2.	Dr A P Mitra Director, NPL New Delhi	Symposium on Wave Propagation and Romote Sensing at Belgium during June, 1983.
International Union of Immunological Societies (IUIS)		
1.	Professor G P Talwar Director National Instt of Immunology AIIMS, New Delhi	V Intl Congress of IUIS at Kyoto, Japan from 21–27 Aug, 1983.
2.	Dr Shobha Sehgal Post Graduate Instt of Medical Education & Research Chandigarh	—do—
3.	Dr Chandna Das AIIMS, New Delhi	—do—
4.	Dr V R Muthukkaruppan Madurai Kamaraj University Madurai	—do—
5.	Dr Anant Rai Scientist Indian Veterinary Res Instt Izatnagar	—do—

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6.	Dr M G Deo Research Director Cancer Research Instt Bombay	V Intl Congress of IUIS at Kyoto, Japan from 21–27 Aug, 1983.
7.	Dr (Mrs) Sudha Gangal Scientific Officer Cancer Research Instt Bombay	—do—

International Union of Biochemistry (IUB)

1.	Professor N Appaji Rao Deptt of Biochemistry Indian Instt of Science Bangalore-560012	III Congress of FAOB at Bankok from November 29 to December 2, 1983.

International Union of Nutritional Sciences (IUNS)

1.	Dr (Mrs) V Purushothaman Professor of Nutrition Sri Avinashilingam Home Science College Coimbatore-641011	IV Asian Congress of Nurition at Bangkok from 1–4 November, 1983.
2.	Dr Indira Narayan Asstt Professor Kalavati Saran Hospital Lady Hardinge College New Delhi-110001	—do—

List of the delegates to whom financial assistance was sanctioned for participation in Non-ICSU Conferences during 1983-84

Sl No	*Name of the Conference*	*Name of the Scientist and Organisation*
1	2	3
	Physical Sciences	
1.	Intl Symposium on Satellite & Computer Communication in France fromApril 27–29, 1983	Dr P Dhar Professor Deptt of Electronics & Electrical Communication Engg Indian Institute of Technology Kharagpur-721302.
2.	VI Rare Earth Conf at Florida State Univ, USA April 18–21, 1983	Dr S P Sangal Professor of Chemistry Laxminarayan Institute of Technology Nagpur-10.
3.	V EUCHEM Conf on Organic & Organometellic Electro-Chemistry at Northern Ireland April 11–15, 1983	Dr J S Jayarama Reddy Deptt of Chemistry Sri Venkataswara University Tirupati-517502.
4.	Intl Conf "CORRISION/83" at California, USA, April 18–22, 1983	Shri Shabih Ahamd C/o Mrs S Ahmad Principal Imambara Girls College Gorakhpur-273001.
5.	III Pacific Chemical Engineering Congress (PACHES–83) at Korea, May 8–11, 1983	Dr S A Puranik Professor & Head Chemical Engg Deptt Faculty of Technology & Engg M S University of Baroda, P. Box 51 Kala Bhavan, Baroda.
6.	Intl Symposium on Nucleic Acids—The Vectors of Life at Jerusalem, Israel, May 2–5, 1983	Dr P K Ponnuswamy Professor & Head Deptt of Physics Bharathidasan University Tiruchirapalli-620020.

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7.	1983 IEEE Intl Symp on Circuits & Systems at California, USA, May 2–4, 1983	Dr P Pal Chaudhuri Professor Computer Centre Indian Institute of Technology Kharagpur-721302.
8.	MELCON 83 at Athens, Greece 24–26, May 1983	Dr D R Kohli Professor & Head Deptt of Electrical Engineering University of Roorkee Roorkee-247667.
9.	IASTED—Intl Symp Energy 82 at San Francisco, USA, May 16–28, 1983	Dr A Kalanidhi Asstt Professor College of Engineering Guindy, Madras-600025.
10.	XL Anniversary 1943–83 Cleveland Spring Conf, Cleveland, USA, May 15–19, 1983	Dr Dulal Goldar Associate Professor (Civil) Punjab Engg College Chandigarh-160012.
11.	Intl Conf on Corrosion Inhibtion at Ballas, Taxes, USA May 15–20, 1983	Dr G N Mehta Lecturer Chemistry Deptt S V R College of Engg and Technology Surat-395007.
12.	IX Canadian Congress of Applied Mechanics at Saskatoon, Canada May 30 to June 3, 1983	Dr T Gangadhariah Assistant Professor Indian Instt of Technology Kanpur-208016.
13.	—do—	Dr P K Datta Assistant Professor Deptt of Aeronautical Engineering Indian Instt of Technology Kharagpur-721302.
14.	First International Symp on Drug Analysis at Brussels, June 7–10, 1983	Dr Ashutosh Srivasatava Lecturer Deptt of Chemistry 171, Bhaldarpura Jabalpur-482002.
15.	Asia Pacific Physics Conference at Singapore June 12–18 1983	Professor J V Narlikar Tata Instt of Fundamental Research Homi Bhabha Road Bombay-400005.

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16.	Summer Workshop on Particle Physics at Trieste, Italy, 20th June to 31st July, 1983	Dr (Km) Rohini M Godbole Lecturer Deptt of Physics Kalina Campus, Bombay-400098.
17.	World Chromatography/ Spectroscopy Conf 1983 at London, UK, June 20–21, 1983	Dr R Srivastava Scientist Chemical Engg Division Regional Research Laboratory Hyderabad-500009.
18.	Quantum Chaos Conf at Como, Italy, June 20–25, 1983	Dr R Ramaswamy Chemical Physics Group Tata Instt of Fundamental Research Homi Bhabha Road Bombay-400005.
19.	Intl Symp on Optical Waveguide Sciences at Kaveilin, China, June 20–23, 1983	Dr Arun Kumar Lecturer in Physics Indian Instt of Technology New Delhi-110016.
20.	IX Intl Symp on Machine Processing of Remote Senses Data at Purdue, USA, June 20–23, 1983	Dr S Arun Kumar Professor, Computer Science Indian Instt of Technology Powai, Bombay.
21.	III Scandinavian Conf on Image Analysis at Copenhagen, Denmark, July 12–14, 1983	Shri B C Kailay Student School of Computer and System Sciences J N U, New Mehrauli Road New Delhi-110067.
22.	Intl Symp on Non-Linearity and Continuity in Partially Presented Concrete at Waterloo, Canada, July 4–6, 1983	Dr P Dayaratnam Professor of Civil Engineering Indian Instt of Technology Kanpur-208016.
23.	VI Intl Symposium on Multivariate Analysis at Pittsburgh, USA, July 25–29, 1983	Dr C G Khatri Professor of Statistics University School of Science Gujarat Univarsity Ahmedabad-380009.

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24.	VII Intl Symposium on Nuclear Quadrupole Resonance Spectroscopy at Kingston—Canada July, 11–14, 1983	Dr K V S Rama Rao Asstt Professor Deptt of Physics Indian Instt of Technology Madras.
25.	IV Intl Conf of Organic Chemistry of Selenium and Telluruim at Birmingham, UK, July 25–29, 1983	Dr B L Khandelwar Deptt of Chemistry Indian Instt of Technology Hauz Khas, New Delhi-110016.
26.	Intl Conf on Stochastic Processes at Cornell Univ, Ithaca, New York, USA from 11–15 July, 1983	Dr M N Gopalan Professor Indian Instt of Technology Powai, Bombay.
27.	NATO Advanced Research Workshop Position Scattering in Gases at Royal Holloway College London, UK from July 19–23, 1983	Dr P S Grover Lecturer Deptt of Physics & Astrophysics University of Delhi Delhi-110007.
28.	VI Intl NMR meet of Royal Society of Chemistry Edinburgh, UK, July 10–15, 1983	Dr S K Bhargava Deptt of Chemistry I P College Bulandshahr (UP).
29.	XI Intl Conf on Comparative Education of Europe at Wurzburg, W Germany, July 3–8, 1983	Dr Purnima Mathur Deptt of Humanities Indian Instt of Technology New Delhi.
30.	World Congress of Solar Enargy at North Australia in August, 1983	Dr V G Bhide Deptt of Physics University of Pune Pune-411007.
31.	Gorden Conf at New Hampshire, UK, 15–19 August, 1983	Dr T V Ramakrishnan Professor of Physics Indian Institute of Science Bangalore-560012.
32.	IV Intl Conf on Mathematical Modelling at Zurich, 15–17 August, 1983	Dr M N Channabasappa Head, Deptt of Karnataka Regional Engineering College P.O. Srinivasanagar-574147 Suratkal (DK)

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33.	III Intl Conf on Numerical Methods in Thermal Problem at Washington, USA, 2–5 August, 1983	Dr K N Seetharamu Deptt of Mech Engineering Indian Instt of Technology Madras-600036.
34.	VII Intl Conf on Near-rings & Near-fields at Virginia, USA 31st July to 6th Aug 1983	Dr M C Bhandari Asstt Professor Deptt of Mathematics IIT, Kanpur-208016.
35.	American Chemical Society Symposium on Macro and Micro Emulsions Theory and Practice at Washington, 26 August to Sept 2, 1983	Professor Dr S N Srivastava Vice-Chancellor Kumaun University Nainital-263001.
36.	VIII Meeting of Intl Magnetic Resonance at Chicago, USA from August 22–26, 1983	Dr U W Kankare Molecular Biology Unit Tata Instt of Fundamental Research Homi Bhabha Road Bombay-400005.
37.	XI Intl Congress of Anthropological and Ethological Sciences in Quebec & Vancouver Canada, August 14–25, 1983	Dr L K Mahapatra Deptt of Anthropology Utkal University, Vani Vihar Bhubaneswar-4.
38.	III Intl Symp on Fossil Algae in Edden Colorada, USA, August 15–29, 1983	Dr (Mrs) Prabha Kalia Lecturer in Geology University of Delhi Delhi-110007.
39.	IX AIRAPT Conf on High Pressure S & T in New York (Albany), July 24–29, 1983	Dr V S Nanda Professor of Physics Deptt of Physics & Astrophysics Delhi University Delhi-110007.
40.	XI Intl Conf on Photo-Chemistry, Maryland, USA August 21–26, 1983	Dr S Aditya Deptt of Chemical Technology Calcutta University 92, APC Road, Calcutta.
41. i)	VII Nuclear Quadrupole Resonance Symp, Kingston Canada, July 11–14, 1983 and	Dr P T Narasimhan, Professor of Chemistry Indian Instt of Technology Kanpur.

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	ii) VIII Meeting of Intl Soceity of Magnetic Resonance, at Chicago, USA form August 22–26, 1983	
42.	VIII IAVSA Symp on Dynamics of Vehicles on Roads and Tracks in MIT, Cambridge, USA. August 15–19, 1983	Dr Virendra K Goel Reader Deptt of Mech Engg University of Roorkee. Roorkee-247672.
43.	Intl Solvent Extraction Conf Denoex, Colorado, USA, August 26 to Sept 1, 1983	Dr Shiv Nath Tandon Professor of Chemistry Deptt of Chemistry Roorkee University Roorkee-247672.
44.	VII Canadian Symp on Theoretical Chemistry Halifax, Canada, August 7–12, 1983	Dr R R Gupta Deptt of Chemistry University of Rajastan Jaipur-302004.
45.	XI Intl Conf on Photo-chemistry, Maryland, USA 21–26 August, 1983	Professor R P Gandhi Head Photochemistry Cell IIT, New Delhi.
46.	XXVI Midwest Symp on Circuit and System in Mexico, August 15–16, 1983	Dr Rabindra Nath Nandi Reader Deptt of Electronics & Telecommunication Engg Jadavpur University Calcutta-700032.
47.	XXIV Polish Solid Mechanics Conf at Warsaw, Poland 22–27 August, 1983	Dr N C Das Reader Deptt of Mathematics Jadavpur University Calcutta.
48.	Solar World Congress at Perth, Austraila, 14–15 August, 1983	Dr G K Sharma Asstt Professor Mech Engg Deptt Indian Instt of Technology Powai, Bombay.

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49.	Intl Conf on Numerical Methods in Laminar and Turbulent flow at Seattle,USA from 8–11 August, 1983	Dr Qamare Hassan Reader Deptt of Mech Engg Aligarh Muslim Univ Aligarh.
50.	VII Intl Conf on Production Research, University of Windsor, Canada from Aug, 22–24, 1983	Shri R N Nauhria Senior Lecturer Deptt of Production Engg Punjab Engg College Chandigarh.
51.	Intl Geoseience and Remote Sensing Symp '83 at San Francisco, USA from Aug 30 to Sept 2, 1983	Professor V K Verma Professor of Geology Deptt of Geology University of Delhi Delhi-110007.
52.	Intl Conference on Optical Materials & Process Technology for Energy Efficiency & Solar Applications at San Diego from Aug 22–26, 1983	Dr Viresh Dutta Lecturer Centre of Energy Studies Indian Instt of Technology New Delhi.
53.	VI IASTED Symp at Athens, Greece from Aug 29–31, 1983	Dr B Bondopadhyay SRA Electrical Engg Deptt Indian Institute of Technology Hauz Khas, New Delhi.
54.	XVI Intl Congress of Refrigeration at Paris, France from Aug 31 to Sept 7, 1983	Dr Satyapal Singh Guleria Research Scholar Indian Instt of Technology Hauz Khas, New Delhi.
55.	XXXI Intl Conf of Human Sciences in Tokyo, Japan from Aug 31 to Sept 7, 1983	Dr Mohd Kamil Research Officer (CCRUM) Chemistry Department Aligarh Muslim University Aligarh.
56.	Intl Solvent Exraction Conf '83 at Colorado from 26th August to 21st Sept, 1983	Professor S M Khopkar Professor of Chemistry Indian Instt of Technology Powai, Bombay-400076.
57.	Intl Conf on Composite Structure, Painslay, Scotland, UK, 14–16 Sept, 1983	Dr B D Agarwal Professor of Mech Engg Indian Instt of Technology Kanpur-208016.

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58.	I Intl Conf on the Chemistry & Tech of the Lanthanides and Actinides, at Venice, Italy, Sept 5–10, 1983	Professor R N Kapoor Head of the Department Deptt of Chemistry University of Delhi Delhi-110007.
59.	SPIE's 1983 Astronomy Conf in London, UK, Sept 5–9, 1983	Dr S N Tandon Reader I-R Astronomy Group Tata Instt of Fundamental Research Homi Bhabha Road Bombay.
60.	VI Intl Pneumoconiosis Conferenee at Bochum, West Germany, 20–23 Sep, 1983	Professor S N Zaidi Adviser Ministry of Railway Laby of Environmental & Occupational Safety and Health M & C Directorate RDSO, Manak Nagar Lucknow.
61.	II Intl Summer School on Processes of Thin Films at Hajduszolooszio Hungary from Sept 18–24, 1983	Dr V Damodara Das Asstt Professor Thid Films Laboratory Deptt of Physics IIT, Madras-600036.
62.	SAE Intl Off-Highway Meeting & Exposition at Milkwankee, Winconsin, USA from Sept 12–15, 1983	Dr R D Garg Professor of Mach Engg Indian Instt of Tech Hauz Khas New Delhi-110016.
63.	XII Intl Colloquim on Group Theoretical Methods in Physics at Trieste, Italy, Sept 5–10, 1983	Dr S Parashar Senior Lecturer Physics Department ARSD College Delhi University, New Delhi-110021.
64.	—do—	Dr K Rama Mohana Rao Lecturer in Applied Maths Andhra University P G Extension Centre Nuzvid-521201.

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65.	Advances in fermentation 1938—London, UK, Sept 21–23, 1983	Dr Subir Kundu SRS Biochemical Engg Res Centre Indian Instt of Technology Hauz Khas, New Delhi-110016.
66.	IV Intl Symp on High Voltage Engg at Athen, Greece, Sept 5–9, 1983	Dr Brijesh Chandra Reader (Electrical) & Director Technical Pubs WRDTC, Univ of Roorkee Roorkee-247672.
67.	II Intl Conf in Practical Design in Ship building at Tokyo, Japan from 16–22 October, 1983	Dr Madhujit Mukherjee Professor Deptt. of Naval Architecture, IIT Kharagpur-721302.
68.	II Asian Congress of Fluid Mechanics in Beijing, China 25–29 Oct, 1983	Dr Gopal R Shevere Associate Professor Aero Department IIT, Bombay.
69.	Intl Postash Technology Conf at Snskatoon, Canada from October 3–5, 1983	Dr B R Dhar Professor & Head Mining Engg Deptt Banaras Hindu Univ Varanasi.
70.	II Intl Symp on River Sedimentation at Nanjing, China from October 11–16, 1983	Dr S N Ghosh Professor of Civil Engg IIT, Kharagpur.
71.	II Asian Congress of Fluid Mechanics at Beijing—China October 25–29, 1983	Dr A S Gupta Deptt of Mathematics Indian Instt of Technology Kharagpur-721302.
72.	IEEE—IAS Annual Soeiety Meeting at Mexico City from October 2–7, 1983	Dr J K Chatterjee Deptt of Elect Engg Indian Instt of Technology Hauz Kuas, New Delhi.
73.	VI Miami Intl Conf on Alternative Energy Sources at Miami Beach, Florida, USA, Dec 12–14, 1983	Dr B S Varshney Professor & Head Deptt of Chemical Engg University of Roorkee Roorkee-247672.

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74.	XIII Biennial Congress of the Intl Deep Drawing Research Group at Melbourne, Australia, Feb 20–25, 1984	Dr R K Ray Asstt Professor Deptt of Metallurgical Engg Indian Instt of Technology Kanpur-208016.
75.	Pittsburgh Conf on Analytical Chemistry & Applied Spectroscopy Atlantic City, USA, March 5–9, 1984	Dr K N Munshi Professar & Head Deptt of Chemistry Nagpur University Nagpur-440010.
76.	Intl Seminar on Quantum Bioenergy in University of Florida, USA, March 11–14, 1984	Dr R K Mishra Professor & Head Deptt of Biophysics AIIMS New Delhi-110029.
77.	Intl Conf on Liquid Chromatographic Course March 19–23, 1984	Dr K S Khetwal Lecturer in Chemistry Kumaun University Nainital.
Biological Sciences:		
1.	Interspeciality Facial Surgery Congress at New York, April 27–30, 1983	Dr S M Batharia Lecturer in Opthalmology AIIMS New Delhi-110029.
2.	VI Asian Congress of Thoracic & Cardiovascular Surgeons at Seoul, Korea, April 20–24, 1983	Dr V K Aggarwal Professor of Surgery MGM Med College Indore.
3.	World Conf of Bryology in Tokyo, Japan, May 22–28, 1983	Dr (Miss) Kavita Rani Sr Scientific Officer Deptt of Sc & Tech Technology Bhawan New Delhi-110016.
4.	—do—	Dr N V Biradar Reader Deptt of Botany University of Poona Pune-411007.

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5.	American Peptide Symp at Tueson University, Arizona, USA from May 22–27, 1983	Shri P Balram Associate Professor Molecular Biophysics Unit Indian Instt of Science Bangalore-550012.
6.	Conf on Groups with High risk of Iron Deficiency in Industrialized Countries in Paris from 27–28 May, 1983	Dr P N Singla Reader in Pediatrics Instt of Med Sc Banaras Hindu University Varanasi-221005.
7.	Intl meeting on Genetic Engg of Plants at Washington, USA from 23–24 May, 1983	Professor B B Biswas Chairman Deptt of Biochemistry Bose Institute 93/1, A P C Road Calcutta.
8.	X Intl Complement Workshop at Mainz, 26–27 May, 1983	Dr L M Srivastava Asstt Professor of Biochemistry All India Instt of Med Sc New Delhi-110019.
9.	Intl Workshop on Plant and Mycoplasma at Singapur from 24–27 May 1983	Dr (Mrs) M Raychaudhuri Project Officer Indian National Science Academy New Delhi.
10.	IV Intl Conf on Fludisation at Tokyo, Japan form 29 May to 3 June 1983	Shri A K Drona Assistant Professor Deptt of Mech Engg G B Pant University of Agriculture & Technology, Pantnagar-263145.
11.	VIII Intl Congress of Cytology Montreal, Canada from 19–23 June, 1983	Dr (Mrs) Mohini Nayar Pathologist B-3/37 Safdarjang Enclave New Delhi-110029.
12.	—do—	Dr B K Sharma Research Officer Cytology Res Centre Maulana Azad Med College Campus BSZ Marg, New Delhi-110002.

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13.	Intl Catecholamine Symp at Goteborg, Sweden, 12–16 June, 1983	Dr P S V R Murthy National Instt of Nutrition Hyderbad-500007.
14.	XI Intl Sea weed Symposium in Quingdao, China from 19–25 June, 1983	Mrs Uma Kanti Tiwari Lecturer in Chemistry AND Degree College 111/163, Harsh Nagar Kanpur.
15.	IAWA/IUFRO Division 5 Conference at Madison, Wisconsin, USA, June 27 to July 5, 1983	Dr K M Bhatt Scientist Wood Science Division Kerala Forest Res Instt Peechi-680653.
16.	IX Meeting of the Intl Society of Neurochem at Vancouver—Canada, 10–15 July, 1983	Dr Najima Zaheer Baquer School of Life Sciences JNU, New Mehrauli Road New Delhi-110047.
17.	XIII Annual Meeting of European Thyroid Association at Madrid, Spain, 11–15 July, 1983	Dr S C Pandav Sr Res Officer (ICMR) Deptt of Medicine AIIMS New Delhi-110020.
18.	Intl Conf on Origin of Life at Mainz, W Germany 10–15 July, 1983	Professor S K Podder Deptt of Bio-chemistry Indian Instt of Science Bangalore-560012.
19.	VII Intl Congress of Radiation Research at Amsterdam, Netherlands from 3–8 July, 1983	Dr (Mrs) J K Bhalla Reader Deptt of Botany Osmania University Hyderabad-500007.
20.	Intl Society of Neurochemistry Congress at Vancouver, Canada 10–15 July, 1983	Professor J J Ghosh Deptt of Biochemistry University of Calcutta 35, Ballygunge Circular Road Calcutta-700019.
21.	Intl Conf on 'Improving University Teaching' at Dublin Ireland from 6–9 July, 1983	Dr (Ms) Rita Ghatak Deptt of Humanities & Social Science Indian Instt of Technology Madras-600036.

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22.	Workshop on Membranne Dynamics and Transport in Hungary, July 6–10, 1983	Dr P M Bhargava Director Centre for Cellular & Molecular Biology Hyderabad-500009.
23.	VII Intl Congress of Radiation Research at Amsterdam, Netherlands, 3–8 July, 1983	Dr P N Srivastava Vice-Chancellor Jawaharlal Nehru University New Mehrauli Road New Delhi-110067.
24.	VIII Intl Conf of Plastic Surgery at Montreal, Canada from June 26 to July 1, 1983	Dr N C Madan Associate Professor of Surgery Deptt of Surgery AIIMS New Delhi-110029.
25.	VIII Asia Pacific Congress on Diseases of the Chest at Tokyo Japan from 11–15 July, 1983	Dr S P Gupta Asstt Professor of Medicine Deptt of Medicine AIIMS New Delhi.
26.	Intl Workshop on Nuclear Acids at Hartifield, UK 6–8 July, 1983	Dr Krishna Mishra Lecturer Deptt of Chemistry Allahabad University Allahabad.
27.	VII Intl World Congress of Psychiatry at Vienna from 11–16 July, 1983	Dr N N Wig Professor & Head Deptt of Psychiatry AIIMS New Delhi.
28.	Intl Symp on Invertibrate Reproduction, at Tibingen, W Germany, 22–27 August, 1983	Dr N B K Nair Deptt of Aquatic Biology and Fisheries University of Kerala Beach PO Trivandrum
29.	Intl Symposium on Vertebrate Morphology at Giessen, W Germany, 22–26 August, 1983	Dr J S Dutta Munshi Postgraduate Deptt of Ecology Bhagalpur University Bhagalpur-512007.

1	2	3
30.	V Intl Symp on Nitrogen Fixation at Noordwijkerhout, Netherlands from Aug. 28 to Sept. 3, 83	Dr B S Ghai Assoc Professor of Genetics Deptt of Genetics Punjab Agril University Ludhiana.
31.	II Intl Symposium on Iron Nutrition and Interactions in Plants at Logan Utah, USA from 2–5 August, 1983	Dr (Mrs) N P Kaur Asstt Plant Physiologist Deptt of Soils Punjab Agril University Ludhiana.
32.	XVIII Intl Ethological Conf at Brisbane, Australia from Aug 28 to Sept 7, 1983	Dr K M Alexander Professor & Head Deptt of Zoology University of Kerala Trivandrum-695001.
33.	III Intl Congress on International Ultrasound at Copenhagen, Denmark Aug 30 to Sept 2, 1983	Dr (Mrs) Manorama Berry Asstt Professor of Radio Diagnosis Deptt of Radio Diagnosis AIIMS New Delhi-27.
34.	V Intl Meeting of the Intl Society for STD Research at Seattle, USA from 1–3 August, 1983	Dr R K Pandhi Assistant Professor Deptt of Dermatology & Venerealogy AIIMS New Delhi-110029.
35.	XI Intl Congress of Anthropological and Ethological Sciences at Vancouver, Canada from 14–25 August, 1983	Dr Raghbir Singh Reader Deptt of Anthropology University of Delhi Delhi-110007.
36.	Intl Conf on Development & Management of Tropical Living Aquatic Resources at Malaysia from August 2–5, 1983	Mohd Javed Kamal Shamsi Research Scholar Deptt of Zoology Aligarh Muslim University Aligarh.
37.	II Intl Congress of ISDCI at Los Angeles, USA from August 14–19, 1983	Dr A K Chakrabarty Reader Immunology & Cell Biology Laboratory University of North Bengal Centre for Life Sciences, P O North Bengal University Darjeeling.

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38.	X Intl Conf of World Association of Advancement of Veterinary Parasitology at Perth, Australia from August 18–20, 1983	Dr W A Nizami Lecturer in Zoology Nizami Villa, Sir Syeed Rd Aligarh-202001.
39.	III Intl Symp on Invertebrate Reproduction at Tubigen (W G) from August 22–27, 1983	Dr R Krishan Kumar Senior Research Fllow Deptt of Zoology University of Calicut Calicut, Kerala-673635.
40.	XIII Intl Congress of Chemotherapy at Vienna, Austria from Aug 28 to Sept 3, 1983	Dr (Mrs) Saroj Gupta Professor of Surgery 2, Medical Enclave Banaras Hindu University Varanasi-221005.
41.	III Intl Congress on Toxicology at San Diego, USA from August 28 to Sept 3, 1983	Dr Ajay K Jain Research Officer Deptt of Medicine Genetic Unit King George's Med College Lucknow.
42.	XII Intl Pigment Cell Conference at Giessen, West Germany from Sept 18–23, 1983	Dr K Chatterjee Reader Deptt of Zoology School of Life Science North Eastern Hill Univ Nongthyammai, Shillong.
43.	Intl Symp on Strategies and Designs at Wageningen, Netherlands, 18–23 Sept, 1983	Dr S N Rai Faculty Member Indian Forest College Dehra Dun.
44.	Intl Congress on Maxilofacial Prosthetics and Technology at London, UK, Sept 6–10, 1983	Dr Hari Prakash Assistant Professor of Dental Surgery AIIMS, New Delhi.
45.	Intl Conf on Heavy Metals in the Environment at Heidelberg, W Germany from 6–9 Sept, 1983	Dr S J S Flora Research Fellow Industrial Toxicology Res Centre Lucknow-226001.

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46.	VIII Intl Chromosome Conf at Lubeck, W Germany, 21–24 Sept, 1983	Dr S R V Rao Zoology Deptt University of Delhi Delhi-110007.
47.	Intl Symp on Biology of Pteridophytes at Edinburgh UK from Sept 12–16, 1983	Dr S C Verma Deptt of Botany Punjab University, Chandigarh.
48.	X World Congress of Social Psychiatry from 4–8 Sept, 1983	Dr Adityanjee Junior Resident Deptt of Psychiatry AIIMS, New Delhi-29.
49.	II Intl Workshop on Campylebacter at Brussels, UK Sept 6–9, 1983	Dr (Mrs) Archna Ayyangari Asstt Professor in Microbiology Postgraduate Instt of Med Edu Research Chandigarh-160012.
50.	I Asian Pacific Congress on Legal Medicine and Forensic Sciences at Singapore from Sept 18–22, 1983	Dr B B L Aggarwal Professor & Head Deptt of Forensic Med University College of Med Sc Ring Road, New Delhi-110029.
51.	VI Asia Pacific Cancer Conference in Sandai, Japan from Sept 27–30, 1983	Professor P N Wahi 21, Uday Park New Delhi-110049.
52.	—do—	Professor Usha K Luthra Sr Dy Director-General (Tech) and Director, Cytology Res Centre ICMR, New Delhi-110029.
53.	XV Intl Symp on Epilepsy at Washington, USA from Sept 26–30, 1983	Dr S Naim Ahmed Research Associate AIIMS, New Delhi-110029.
54.	III Conf on Epidemiology in Occupational Health at Singapore from Sept 28–30, 1983	Dr Neeraj K Sethi Lecturer Preventive & Social Medicine University College of Med Sc Ring Road, New Delhi-110029.
55.	Intl Conf of National Association for Environmental Education at Michigan, USA from Sept 28 to Oct 5, 1983	Dr Deshbandu Deptt of Landscape Architecture School of Planning & Architecture IP Estate, New Delhi.

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56.	—do—	Dr (Mrs) S K Sharma Lady Irwan College Sikandara Road New Delhi-110001.
57.	VIII Intl Conf on Calcium Regulating Hormones at Kobe, Japan from 18–24 October, 1983	Dr S A Suryavanshi Reader Deptt of Ecology Nagpur University Amravati Road, Nagpur.
58.	—do—	Dr D M Dableshwar Deptt of Zoology Nagpur University Campus Nagpur-440010.
59.	I Soviet Indian Symp on Neurophysiology at Armenia, USSR 11–13 October, 1983	Dr B Bhatia Director-General Environment & Nutramul Health Research Organisation Hauz Khas Enclave, New Delhi.
60.	—do—	Dr V Mohan Kumar Asstt Professor of Physiology AIIMS, New Delhi-110029.
61.	VI Asian & Oceanian Congress of Neurology at Taipai from November 13–17, 1983	Dr Sneh Bhargava Professor of Radiology AIIMS New Delhi-110029.
62.	—do—	Dr (Miss) Madhuri Behari Asstt Professor of Neurology G B Pant Hospital New Delhi-110002.
63.	X Intl Congress for Plant Protection at Brighton, UK from Nov 20–25, 1983	Dr S K Midha PSO Deptt of Science & Technology Technology Bhavan, New Mehrauli Road New Delhi.
64.	XVII Intl Congress of Pediatrics at Manila, Philippines from November 7–12, 1983	Dr G P Katiyar Reader in Pediatrics Instt of Medical Sciences Banaras Hindu University Varanasi-221005.

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65.	Intl Conf on Environmental Hazards of Agro-Chemicals in Developing Countries at Alexandria, Egypt from November 8-12, 1983	Dr I S Grover Deptt of Biology Guru Nanak Dev University Amritsar.
66.	School on 'Ribosome' at Rehovot, Israel from November 20-30, 1983	Dr D P Burma Molecular Biology Unit Deptt of Biochemistry Indian Instt of Med Sc Banaras Hindu University Varanasi-221005.
67.	XIII Eastern Regional Tuberculosis Conference of IUAT at Jakarta, Indonesia, November 20–25, 1983	Dr J N Banavaliker Chest Physician RBTB Hospital, D-7 Kingsway Camp Delhi-110007
68.	X International Congress Plant Protection at Brighton, UK from November 20–23, 1983	Dr V K Gupta Associate Professor Deptt of Mycology & Plant Pathology H P Krishi Vishwa Vidyalaya Solan-173230 (HP)
69.	—do—	Miss Neelu Nangia Research Assistant Deptt of Entomology University of Agril Sci Hebbal, Bangalore-560024.
70.	VIII Asian Pacific Congress of Cardiology at Taipei, Taiwan from 27 November to 2 Dec, 1983	Dr R K Behra 35-Polo Ground I Jagji Bhavan, Jodhpur.
71.	—do—	Dr K S Reddy Lecturer in Cardiology Deptt of Cardiology AIIMS, New Delhi-110029.
72.	VI Intl Wheat Genetics Symp at Kyoto, Japan from 28 Nov to 3rd December, 1983	Dr K S Gill Director of Research Punjab Agricultural Univ Ludhiana.

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73.	VI Intl Wheat Genetics Symp at Kyoto, Japan from 28 Nov to 3 December, 1983	Dr Arvind Kumar Misra Lecturer Deptt of Agri Botany Gauhati University Gauhati-781014.
74.	148th Meeting of the Pathological Society of Great Britain & Ireland in London from 4–6 January, 1984	Dr H D Tandon Director AIIMS New Delhi-110029.
75.	II Meeting of the Consultative Group on Ecology of Bruchids from January 19–20, 1984	Dr Shiv Kumar Singal Asstt Entomologist Entomology Department Haryana Agril University Hissar.
76.	VII Intl Symposium for Tropical Ecology at Lagos (Nigeria) 11–16 March, 1984	Dr V K Sharma Deptt of Botany DAV (PG) College Muzaffarnagar.
77.	VII Congress of the Asian Association of Pediatric Surgeons at Manila, Phillipines 1–3 March, 1984	Dr P Upadhayay Professor & Head Deptt of Pediatric Surgery AIIMS New Delhi-110029.
78.	Intl Envionment & Safety Lambate Ltd, New Gate, St Albans, Hert, UK 27–29 March, 1984	Dr M K Saksena Reader Department of Zoology University of Saugar Sagar (MP).
79.	Intl Congress on Mountain Medicine, at Chamonix, France 22–25 March, 1984	Dr C Vidyasagar Assoc Professor & Head Deptt of Neurosurgery St John's Medical College Bangalore-560034
80.	Intl Pediatric Nephrology Association at New York, USA 15–16 March, 1984	Dr R N Srivastava Assoc Professor of Pediatrics AIIMS, New Delhi.

Reporting of INSA—Costed Travel Fellowships to Young Scientists

Sl No	*Name of the Conference, Date and Venue*	*Name of the Scientist & Organisation*
1	2	3
1.	Sanibel International Symp on Quantum Biology and Quantum Pharmacology at Florida USA from 14–16 March, 1983	Dr Sudha Mahajan Centre for Biomedical Engineering IIT and AIIMS New Delhi-29.
2.	World Conference of Bryology at Tokyo, Japan from 22–28 May, 1983	Dr S C Bhatla Research Associate Deptt of Botany Delhi University Delhi-110007.
3.	Intl Congress of Cytology at Montreal, Canada from 19–24 June, 1983	Dr (Ms) Gita Jayaram Lecturer in Pathology Maulana Azad Medical College Bahadur Shah Zafar Marg New Delhi-2
4.	Short-term Training programme on Immunocytochemistry and Freeze-Fracture labelling at Paris France for 3 months	Dr L Singotam Cytology Research Centre Ultrastructure Unit Maulana Azad Medical College B S Zafar Marg New Delhi-110002.
5.	IX Course-X-Ray Crystallography and Drug Action: Current Perspectives at Erice, Italy from 21 March to 1 April, 1983	Shri B V V Prasad Research Associate Molecular Biophysics Unit Indian Instt of Science Bangalore-560012.
6.	II International World Conference 1983 on Continuing Engineering Education at Paris, France from 6–8 April, 1983	Dr D S Mishra Lecturer in Faculty of Engg Dayalbagh Educational Institute Dayalbagh, Agra

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7.	III Middle East Corrosion Conf at Bahrain, Saudi Arabia from 16–18 May, 1983	Dr K Baba Pai Lecturer Deptt of Metallurgical Engg Karnataka Reg Engg College Surathkal-547157.
8.	International Congress of Essential Oils, Singapore from 12–17 March, 1983	Dr C S Mathela Deptt of Chemistry DSB Constituent College Kumaun University Nainital-263002.
9.	VI International Congress on Photosynthesis, Vrije Universiteit, Brussels, Belgium from 1–6 August, 1983	Dr A S Raghavendra Deputy Director Plant Pathology The Rubber Research Instt of India Kottayam
10.	II Intl Congress of Reproductive Immunology from 17–20 August, 1983	Dr S K Gupta National Instt of Immunology P B No 4922 New Delhi-110029.
11.	V Intl Congress of Immunology in Kyoto, Japan from 21–27 August, 1983	Dr K B Sainis Medical Division Bhabha Atomic Research Centre Trombay, Bombay
12.	—do—	Dr S K Dubey Centre for Cellular & Molecular Biology Hyderabad
13.	XXIX Intl Congress of IUPI at Sydney from August 28–Sept. 3, 1983	Dr K Ravi DST Centre for Visceral Mechanisms V P Chest Institute Delhi-110007.
14.	VIII International Chromosome Conference at Lubeck, West Germany from Sept 21–24, 1983	Dr Sher Ali Deptt of Zoology Aligarh Muslim University Aligarh (UP).
15.	X Intl Conference on General Relativity and Gravitation held at Padova (Venice) in Italy from July 4–9, 1983	Dr S K Chatterjee Lecturer in Physics Banwarilal Bhalotia College Asansol, West Bengal-713303.

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16.	Ultrasonics Intl 83 Conf at Dalhousie University, Halifex, Canada form July 12–24, 1983	Sh Mukesh Chandra Ultrasonics Section National Physical Laboratory Hillside Road, New Delhi-110012.
17.	School on Direct Methods on Macromolecular Crystallography, Buffalo from July 20–29, 1983	Miss V Lalitha Deptt of Crystallography and Biophysics University of Madras Madras-600025.
18.	Gordon Conference on Quantum Solids & Fluids at Worfeboro, New Hampshire from 15–19 August, 1983	Dr H R Krishnamurthy Deptt of Physics Indian Instt of Science Bangalore-560012.
19.	Intl Conference on Instrumentation in Astronomy V held in London from Sept 7–9, 1983	Dr K C Sahu Physical Research Lab Ahmedabad.
20.	IV Intl Conference on Solid State Ionics held at Grenoble, France from 4–8 July, 1983	Dr K Hariharan Deptt of Physics Indian Instt of Technology Madras-600036.
21.	24th Microsymposium on copolymers at Ptogue (Czeochoslavakia) from 11–14 July, 1983	Dr R K Aggarwal Lajpat Rai P G College Sahibabad (UP).
22.	III FAOB Congress at Bangkok from Nov 29 to Dec 2, 1983	Dr (Ms) S J Makhija SBES Sci College Aurangabad-431001.
23.	Solar World Congress in Parth, Australia in August, 1983	Dr S N Sahu Deptt of Physics Banaras Hindu University Varanasi.
24.	Intl Congress of Anthotopological and Elthnological Science in Canada from 14–17 August 1983	Dr (Ms) S Tara Devi Deptt of Anthropology University of Delhi Delhi-110007.
25.	Intl Association for the Physical Sciences of the Ocean in Hamburg, West Germany from 15–27 Aug 1983	Dr B K Sahu Deptt of Marine Studies Berhampur University Berhampur-760007.

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26.	IV Intl Conference on Mechanical behaviour of Materials, Royal Instt of Technology in Sweden from 15–19 August, 1983	Dr A N Kumar Deptt of Applied Mechanice IIT, New Delhi-110016.
27.	Intl Congress of Mathematicians at Warsaw, Poland from 16–24 August, 1983	Shri R Bhatia Centre of Advanced Study in Mathematics University of Bombay Bombay.
28.	Intl Symposium on Research in Biology and Biotechnology in Developing Countries in Singapore from 2–4 November, 1983	Dr M K Durga Prasad Lecturer Deptt of Zoology Nagarajuna University Nagarjuna Nagar (AP)
29.	X Intl Congress of Plant Protection in Brighton, UK from 20–25 Nov, 1983	Dr S P Bhardwaj Asstt Scientist Regional Fruit Res Station Mashobra, Simla-171007.
30.	IX Asian-Pacific Weed Science Society Conference at Manila, Phillippines, from Nov 28–Dec 2, 1983	Dr A Narayana Rao Plant Physiologist A P Agril University Palem-509215.
31.	III Congress of FAOB at Bangkok, Thailand from Nov 29–Dec 2, 1983	Dr (Mrs) Chitra Mandal Scientist Indian Instt of Chemical Biology Jadavpur, Calcutta-32.
32.	Short-term Trg Programme on Orthopadische Universitatsktinik and poliklinik in W Germany for three months	Dr R R Naik Asstt Professor of Orthopaedic Deptt St John's Med College College Hospital Sarjapur Road Bangalore-34.
33.	Short-term Trg under Dr M Ray Children's Hospital Winnipeg Manitoba, R3E OW1, Canada	Dr A K Giri CAS in Botany Univ of Calcutta 35 Ballygunge Circular Road Calcutta-19.

1	2	3
34.	III Intl Symposium on Offshore Mechanics and Arctic Engineering, New Orlands USA from 12–16 Feb, 1984	Shri A K Jain Sr Scientific Officer Indian Instt of Technology New Delhi-16.
35.	Training of Palaeobotanical Research at the Imperial College, London for 2 months	Shri P K Pal Sr Scientific Asstt Birbal Sahni Instt of Palaeobotany 53 University Road Lucknow-236007.
36.	Training in Surgical treatment of hip diseases at West Germany from January to March, 1984	Dr R R Naik Asstt Professor Deptt of Orthopaedics St John's Medical College Bangalore-560034.
37.	Spring College on Physics of Semi-Conducting materials and devices at ICTP, Trieste, Italy from April 26–June 22, 1984	Dr S P Sanyal Research Associate Deptt of Postgraduate Studies & Research in Physics Univ of Jabalpur Jabalpur-482001.
38.	V American Conference on Theoretical Chemistry, Jackson, Wyoming, USA from 16–21 June, 1984	Dr N Sathyamurthy Assistant Professor Department of Chemistry IIT, Kanpur-208016.

Forthcoming Seminar/Symposium/Conferences etc.

1. II International Rangeland Congress at Australia from May 14-18, 1984.
2. International Conference on Abundance Ratios in the Solar System at Paris, France from June 19-22, 1984.
3. CHEMRAWN III World Conference on Resource Material Conversion to meet Future Needs at Netherlands from June 25-29, 1984 sponsored by Royal Netherlands Chemical Society.
4. IUPAC sponsored XXVI Microsymposium on Macromolecules : Polymers in Medicine and Biology at Prague, Czechoslovakia from July 9-12, 1984.
5. IUPAC sponsored XXVII Microsymposium on Macromolecules : Physical Optics of Dynamics Phenomenon and Processes in Macromolecular Systems at Prague, Czechoslovakia from 16-19 1984.
6. IUPAB sponsored VIII International Biophysics Congress at Bristol, UK, from July 29-August 4, 1984.
7. IUPAC sponsored V International conference on Organic Synthesis at Freiburg i.Br., Federal Republic of Germany from August 27-30, 1984.
8. IUPAC sponsored IX International Conference on Raman Spectroscopy at Tokyo, Japan from August 27-September 1, 1984.
9. X International Symposium on the Reactivity of Solids at Dijon (France) from August 27-September 1, 1984.
10. V International Conference on Rapidly Quenched Metals, RQ 5 at Wurzburg, Federal Republic of Germany from September 3-7, 1984.
11. IUTAM Symposium on Optical Methods in the Dynamics of Fluids and Solids at Prague, Czechoslovakia from September 17-21, 1984.
12. International Symposium on Genetic Manipulation in Crops at Beijing, China from October 22-26, 1984.

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XVI Rare Earth Research Conference, Florida, USA (S P Sangal); International Symposium on Statellite and Computer Communications, Versailles, France (P Dhar); International Symposium on Methods and Instrumentation for Investigation of Groundwater System, Noordwijkerhout, Netherlands (H P Patra); IASTED International Symposium Energy '83, San Francisco, USA (A Kalanidhi); International Conference on Corrosion Inhibition, Houston, Texas, USA (G N Mehta); VIII American Peptide Symposium, Tueson, Arizona, USA (P Balaram); World Chromatography Spectroscopy Conference, London, UK (R Srivastva).

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